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ABSTRACT

This study was designed to assess two projects implemented by the Unified Science and Mathematics for Elementary Schools (USMES) program. The program is based on the belief that elementary school students learn mathematics, science, social science, and language arts skills quickly by investigating practical problems taken from the local school and community environment; and, in addition, gain competence in problem solving. The teacher's role is primarily consultive and supportive; full exploration of a problem continues for several months when integrated with other activities. The program utilizes design labs equipped with tools and construction materials for problem solving. Fifty teachers attended a four-day workshop and a course as training for the district-college USMES model implemented in seven target schools in Lansing, Michigan. The program was also implemented as a district-only model in 170 schools in Chicago, Illinois. Information was gathered concerning participant satisfaction, cost analysis, usage rates, and dissemination and usage factors. In addition, on-site visitations and teacher questionnaires were used to determine teachers' perceptions of the USMES program. A sample questionnaire is included. Results indicated the projects were ineffective in dissemination and utilization of USMES curriculum, but this failure was attributed to implementation factors, rather than the program itself. (Author/JAC)

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Evaluation of USMES Implementation Projects

by

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An evaluation report submitted to Unified Science and Mathematics for Elementary Schools (USMES), Education Development Center, 55 Chapel Street, Newton, MA 02160. (September 1975)

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Evaluation Report*

USMES Implementation Projects
Lansing and Chicago, Area A

I. PURPOSE

This evaluation was designed to gather information about two implementation models supported by the National Science Foundation: a combined district-college model in Lansing, Michigan, and a district-only model in Chicago, Area A. The Lansing project was the first implementation project for the program entitled Unified Science and Mathematics for Elementary Schools (USMES) and began in 1972. The Chicago project started one year later in 1973.

These two projects were funded by the Special Projects Group of the Office of Experimental Projects and Programs at the National Science Foundation. The evaluation is intended to provide information for individuals and organizations which have responsibility for making decisions on implementation strategies. Of particular interest is a description of the models and an assessment of their effectiveness in implementing the USMES course.

In 1973, NSF began an extensive program of curricula dissemination and utilization through its Instructional Improvement and Implementation Section (IIIS). It is our understanding that this Section is currently reviewing its policies and procedures for implementation. An additional purpose of this evaluation is that it will provide information which may be useful in that review process.

From the foregoing discussion, it is clear that this evaluation is decision-centered; that is, we are gathering information for a variety of decisions that must be made about USMES, about its several implementation approaches, and about curricular implementation in general. We believe the evaluation report provides a backdrop of information that will assist in the decisions faced by the several audiences of this study.

*The authors gratefully acknowledge the assistance of Jeanene Noll in the conduct of this study and the preparation of the report.

Audiences

The primary audiences for this report are the National Science Foundation and the USMES staff. Not only are they supporting this study, but they are most concerned about the two experiments. NSF has considered from time to time the feasibility of funding school districts directly rather than work through colleges. Furthermore, the unique district-university cooperation in Lansing provided an opportunity for a long-term follow-up of implementation impact.

The USMES staff continuously faces the problem of marketing (to borrow a business term) their product. They need evidence on what procedures work with a new curriculum such as USMES and, equally as important, what does not work. The Lansing and Chicago projects are seen as opportunities not only to continue to develop and evaluate the curriculum, but opportunities to explore alternative ways of transmitting the USMES story.

Secondary audiences for this evaluation include the Lansing and Chicago school districts, collaborators in this effort, and the education profession in general. The latter group includes school personnel, college scientists and educators, and those professionals specifically interested in the curricular change process. All of these audiences were kept in mind as the evaluation was planned and conducted. Hopefully, each audience will find some useful information in this report.

Evaluators: Bias and Rationale

This evaluation was carried out by two persons with backgrounds in science, science education, and educational psychology. The orientation of the senior author is for decision-centered evaluation, with a strong inclination to conduct experimental studies whenever possible. The use of some kind of a comparison, in our opinion, does much to give meaning to evaluation results. In this study, Lansing and Chicago are often compared to each other, and both are compared to data we have on other implementation projects.

Our approach is one of multiple data points; that is, we have utilized a variety of evaluative criteria. Implementation is a multifaceted activity; we believe an effective evaluation is also multifaceted. This is true in the use of multiple criteria as well as using several data gathering techniques.

Finally, we look upon this evaluation as a formal supplement to the myriad of informal evaluations of these models that already have taken place. Certainly, NSF, USMES, and the districts have constantly assessed their work. We hope the formalization of this process by an external team brings new insights and understandings to the Lansing and Chicago experiments.

II. EVALUATION PROCEDURES

The Evaluation Team

The evaluation team consisted of Dr. Wayne Welch and Mr. William Ward, both at the University of Minnesota.

Dr. Welch, a Professor of Educational Psychology in the College of Education, has had extensive experience in program evaluation, particularly in the field of science education (e.g., Harvard Project Physics, PSNS, Ginn Elementary Science Program). He holds academic degrees in science and in science education.

Mr. Ward is currently pursuing a Ph.D. program in measurement and evaluation at the University of Minnesota. He has had experience in the public schools of New York State as both a science teacher and science supervisor, and holds academic degrees in science and educational administration.

Objectives

There were five prime objectives to the evaluation:

(1) To describe the context of the implementation attempts;
(2) To describe the implementation strategies as proposed;
(3) To describe the implementation strategies as carried out;
(4) To determine the impact of the projects;
(5) To draw, so far as possible, inferences useful in planning subsequent implementation efforts of both USMES and other curricula.

The specific procedures described below were designed to gather and process the data necessary for meeting these objectives. The evaluators met and spoke personally with 50 persons related in some fashion to the implementation efforts under study. A complete list of the interviewees appears following the next section. Summary impressions were written for each interview and used in preparing the final reports. Samples of these summaries are found in Appendix D. In addition, written communication was attempted with all teachers trained under the grant. All activities were conducted between April and August 1975.

It should be noted that the entire USMES central staff was unfailingly cooperative and responsive to the evaluation team. Their posture was a marked facilitator to the conduct of this study.

Data Sources

Review of Pertinent Documents

Printed materials addressing the USMES project's history and philosophy were studied along with the formal proposals to the National Science Foundation for funding the two trial implementation strategies. A sample of

USMES-produced printed materials intended for use by classroom teachers was scanned along with recent journal articles concerning USMES activities. Several items of correspondence relating to the specific implementation grants were made available to the evaluators and proved of value. Finally, the records of the Registrar's Office at Michigan State University relating to that institution's contribution to the Lansing strategy were examined.

Review of Prior Evaluation

Extensive reports of the teacher-training workshops conducted under the two strategies had been prepared. These were reviewed to determine the scope and focus of the training that had been provided as well as the actual mechanics of its provision. The participant lists included in these reports were regarded as definitive.

A moderate amount of data gathering had taken place in Lansing over the course of the implementation effort. This included, among other things, interviews with building principals, questionnaires to teachers and students, and narrative reports of USMES class activities prepared by both teachers and observers. These sources were scanned to determine their general drift. They were, however, not considered in detail, nor were they regarded as prime data sources for the present study, since the methods in which the data were collected were frequently unclear or subject to questions of validity or bias.

Interaction With USMES Central Staff

Two meetings were held in Massachusetts between members of the USMES central staff and the evaluation team, the first on April 24-25 and the second on August 22.

On the April dates, both members of the evaluation team had the opportunity to meet at length with Dr. Earle Lomon, Project Director; Mr. Thom Brown, Associate Director for Implementation; Ms. Carolyn Arbetter, Coordinator for Evaluation Programs and Implementation Resources; and Mr. Charles Donahoe, Coordinator for Design Labs and Informational Services. This first meeting served to familiarize the evaluation team with the entire USMES project and, specifically, with the two implementation efforts which were to be investigated.

In August, Dr. Welch alone met with Dr. Lomon, Ms. Arbetter, and Mr. Daniel Cooper, Evaluation Research Associate. This meeting was to update USMES on the progress of the evaluation study, to solicit reactions to the activities and findings to date, and to clarify the evaluator's understanding of the central staff's views and perceptions on several issues.

The evaluators had additional in-person contact with members of the central staff during two site visits, May 21-22 in Chicago and May 15 in Lansing. At these times, matters specific to each implementation effort were easily and meaningfully discussed.

In addition to the in-person meetings, frequent telephone and written communication were maintained. Periodic status reports provided to the central staff for their comments and requests for specific information made as the need arose allowed for an ongoing interchange of thoughts and ideas.

On-Site Visitations

The implementation sites, Lansing and Chicago, were each visited twice. In both cases, the initial visit was to attend a troubleshooting meeting held in the district. These initial visits allowed the evaluators to become familiar with the characteristics of the target areas and to establish contacts with local district personnel. As observers to the meetings, they became aware of local USMES status and problems. These initial visits also provided for added contact with USMES staff members, as discussed above.

During the second visit to each site, the evaluation team was able to meet with and interview at length a sample of teachers and principals from the target areas. Four schools were visited in each city, the specific schools chosen on the basis of prior information in an attempt to view examples of successful and unsuccessful implementation at both sites. At each school, one team member interviewed the building principal while the other met with as many USMES trained teachers as could be arranged. (Reports of teacher interviews are found in Appendix D.) In total, eight principals and 23 teachers were spoken with at length to determine their perspective on the implementation effort relative to their specific situation.

Additional persons at each site thought to have a significant role in the implementation strategy were also interviewed during the second visits. These were the Area A Curriculum Director--Mr. John Gearon, and Area A Science Coordinator--Ms. Mary Nalbandian, in Chicago; and the Michigan State University Coordinators--Dr. William Fitzgerald and Dr. John Masterson, a district administrator--Mr. Warren Bailey, and a district-USMES liaison person--Ms. Lucy Knappen, in Lansing.

Questionnaire

The interview schedule described above could reach only a limited sample of the buildings and teachers involved in the implementation efforts. In order to gain a wider base, a questionnaire was prepared and sent to all teachers who had received training in USMES as part of either the Chicago or Lansing strategy. In addition to certain descriptive information, the questionnaire was designed to address four issues:

(1) Teachers' perception of the USMES program;
(2) Teachers' satisfaction with their workshop training and with the support for USMES usage which they have received from various parties subsequent to their workshop training;
(3) Teachers' use of the USMES program in their classes;
(4) Teachers' assessment of the utility of various interventions as facilitators of greater USMES use.

The instruments sent to Chicago and Lansing teachers were identical except for wording changes in two items which referred to the local situation.

All questionnaires were sent to school addresses since these were the only ones available. After a reasonable waiting period, teachers who had not responded to the questionnaire were sent a follow-up letter including a shortened form of the questionnaire containing only a few key items, primarily those indicating use.

Response rates for the questionnaire were 70% for Lansing and 58% for Chicago. The questionnaires are reproduced in Section IV.

Other Procedures

Data useful to the evaluation study were collected in several additional ways.

On May 2, one member of the evaluation team was able to attend an informational meeting at which USMES was being introduced to approximately 100 teachers in Chicago, Area B, the west side. By so doing, he was able to meet and interact with teachers new to the USMES ideas and with curriculum specialists in the early stages of planning while keeping the context, Chicago, constant.

The evaluation team discussed the workings of the Chicago school system with Dr. Herbert Walberg, Professor of Urban Education at the University of Illinois, Chicago Circle Campus. This meeting brought additional insights into the ways of this highly complex school district, and helped clarify several previously troublesome points.

Finally, the evaluation team was able to observe USMES teacher training in a third and somewhat more familiar setting by visiting a summer workshop in St. Paul, Minnesota, and by so doing to become better aware of the contextual effects in such training.

Personal Contacts

In-person discussions and/or interviews were held with the following during the evaluation activities.

USMES Central Staff

Dr. Earle Lomon - Project Director
Mr. Thom Brown - Associate Director for Implementation
Ms. Carolyn Arbetter - Coordinator for Evaluation Programs and Implementation Resources
Mr. Charles Donahoe - Coordinator for Design Labs and Informational Services
Mr. Daniel Cooper - Evaluation Research Associate

Chicago Area A

Mr. John Gearon - Area A Curriculum Director
Ms. Mary Nalbandian - Area A Science Coordinator
Ms. Martha Cleveland - Principal, Tesla School
Ms. Beverly Daniels - Principal, Mann School
Mr. Joseph Lavizzo - Principal, Bryn Mawr School
Mr. Salvatore Vallina - Principal, Ray School

15 USMES trained teachers

Lansing

Dr. William Fitzgerald - Michigan State University
Dr. John Masterson - Michigan State University
Mr. Warren Bailey - Principal, Maple Hill School
Mr. Robert Gann - Principal, Everett School
Ms. Mildred Richardson - Principal, North School
Ms. Frances Rossman - Principal, Pleasant View School
Mr. Ed Spink - Principal, Kendon School
Ms. Lucy Knappen - Lansing teacher and district-USMES liaison

9 USMES trained teachers
2 USMES Design Lab managers

NSF

Dr. Alphonse Buccino - Head, Problem Assessment and Special Studies Group
Dr. Howard Jones - Evaluator, Precollege Education in Science Division

Other

Ms. Ora McConner - Area B Curriculum Director
Mr. Herbert Bradfield - Area B Curriculum Consultant
Dr. Herbert Walberg - University of Illinois at Chicago Circle
Dr. Alan Humphreys - University of Minnesota, USMES Workshop Consultant
Dr. Thomas Post - University of Minnesota, USMES Workshop Consultant

Chronological Summary of Evaluation Activities

March 1	Initial meeting of Welch and USMES staff at Bloomington, Minnesota
April 2	Welch meeting with Buccino at NSF, Washington, D.C.
April 27-28	Welch and Ward meet with USMES central staff at EDC, Newton, Massachusetts

May 2	Ward attends Chicago, Area B informational meeting
May 3	Welch and Ward attend Chicago, Area A evaluation meeting
May 8	Welch and Ward meet with Walberg
May 15	Welch attends Lansing evaluation meeting
May 19	Questionnaires sent to teachers
May 21-22	Welch and Ward visit Chicago schools
June 4-5	Welch and Ward visit Lansing schools and Michigan State University
June 9	Follow-up to questionnaires sent
July 11	Welch and Ward visit USMES workshop in St. Paul, Minnesota
August 21	Welch visits with USMES staff--Lomon, Arbetter, and Cooper
September 15	First draft of report sent to USMES office

III. PROGRAM DESCRIPTION

Objectives of the Implementation Activities

The activities funded under Grant GW-7626 and its two subsequent amendments have as their prime purpose, from the National Science Foundation perspective,

> "...to provide valuable and otherwise unattainable information for individuals and organizations who have responsibility for making decisions on implementation strategies." (West, 1975)

It seems this "valuable information" was not intended to be totally USMES curriculum specific but have some generalizability to decisions regarding implementation strategies for a number of curricula and programs.

The vehicle for obtaining this information was to be two efforts at implementation of the Unified Science and Mathematics for Elementary Schools (USMES) program in districts representative of those containing a large proportion of the nation's school population. The USMES program briefly is described below. The two strategies or "models" detailed in following sections differed primarily in teacher training responsibility and procedures. They shared, however, the common objective of maximizing the usage of the USMES program.

The USMES central staff formally shared the view that the implementation efforts were to be information productive, stating:

> "The purpose of the district implementation experiments is to gain a more complete understanding, based on real experience, of the problems of implementing USMES on a district-wide basis and the strategies needed to overcome the problems." (USMES Central Staff, 1974)

The USMES central staff had engaged in a substantial number of informal evaluation activities focusing on dissemination and implementation strategies for their program. They appear to have felt they had reached a stage where a formal external evaluation of two strategies could produce results of value in furthering their dissemination goals.

Thus, the objectives of the implementation efforts funded were not simply the introduction of USMES into two specific schools systems but, also and more basically, the production of generalizable knowledge relative to the implementation process. There is some question as to whether local personnel in the two districts were in sympathy with or even aware of the broader goals. All those interviewed indicated they saw the sole purpose of the implementation activities as being, (1) the introduction of USMES into their schools, and (2) learning if USMES, not the implementation, was working.

The USMES Program

The USMES project was formed in response to the recommendations of the 1967 Cambridge Conference on the Correlation of Science and Mathematics in the Schools and operates within the administrative structure of the Education Development Center (EDC) at Newton, Massachusetts, a Boston suburb. The USMES central staff most concerned with implementation efforts currently are an Associate Director for Implementation, a Coordinator for Evaluation Programs and Implementation Resources, and a Coordinator for Design Labs and Informational Services. Since its inception, Dr. Earle Lomon, a physicist at the Massachusetts Institute of Technology, has been USMES Project Director.

The rationale for USMES states the belief that students (grades 1-8) learn many math, science, social science, and language arts skills quickly in the context of student investigation of real problems and, in addition, gain competence in problem solving, per se. Real problems are defined as practical problems taken from the local school/community environment. Some examples are producing an economically feasible soft drink, describing people, or reducing lunchroom congestion. Students are expected to perceive and analyze the problem, prepare solutions, execute the solutions, and evaluate their adequacy. The role of the teacher is seen as being primarily consultive and supportive rather than directive, following the initial introduction of the problem or "challenge." It is expected that full exploration of a challenge will last for several months when integrated with other school activities. Printed Teacher Guides currently exist for approximately 30 challenges.

Since the solution of many challenges requires the physical design and construction of devices or products, the USMES organization recommends that each user school have a "Design Lab" equipped with various tools and construction materials. Ideally, this is to be a shop-type room, staffed by a "Design Lab Manager," in which students may come to work as their pursuit of a challenge demands. A mobile cart carrying tools and supplies is proposed as an alternative. Recently, the USMES central staff has been attempting to present the availability of a Design Lab as desirable rather than essential to USMES implementation.

A more completed description of the USMES program may be found in The USMES Guide (EDC, 1974).

Settings

Lansing, Michigan

(population 130,000; public school enrollment 31,000)

State Capitol of Michigan, Lansing is located 100 miles west of Detroit. In addition to government the city contains diversified medium and light industry, much related to automotive production.

Lansing has a central "downtown" business and industrial district surrounded by high density, low quality housing, much of which is occupied by minority tenants. The outer sections of the city contain mainly single unit housing and far fewer minority residents. Many upper managerial and professional people employed in Lansing choose to make their homes outside the city limits.

The city, and especially its education system, is strongly influenced by the presence of sprawling Michigan State University in East Lansing, across the Grand River.

The Lansing school system, immediately prior to the USMES implementation effort in 1972, operated 48 elementary schools, each moderate to small in size and serving its local neighborhood. The central administration was quite distant, administrating the schools through four "Area Principals," each of whom had responsibility for 11 schools in addition to his own. Communication and interaction between teachers from different buildings is generally sparse today, as is the effect of various inter-building committees on what is actually done in the classroom. There is no evidence to suggest the situation was not similar three years ago. Likewise, principals and teachers are receiving only modest demands for specific student achievements from the community and/or central administration. If anything, these demands were even less in 1972-73. While the system as a whole was expected to produce mathematically competent children, specific responsibilities were not laid down at that time. Science instruction in the elementary schools was regarded as nonessential.

Several teachers in the district were already quite involved with the USMES organization through the field testing in their classrooms of various new challenges. These people had received extensive training from the USMES central staff and were receiving modest compensation from USMES for their development efforts. This group of "development teachers," centered at the Allen Street Elementary School, thus provided in the system a core of involvement and, hopefully, knowledgeable, enthusiastic, and successful users of the USMES program.

During the spring of 1972 when the final planning for the USMES implementation took place, the Lansing schools appear in total to have been functioning with adequate, if not abundant, resources and to have been providing a comfortable, though not particularly challenging, environment for students and teachers in most of its 48 neighborhood elementary schools. The neighborhood school concept, and its resulting racial imbalance, was soon to be relaxed, however, in a move having a major effect on the implementation effort. This will be discussed under Implementation Models as Practiced.

Chicago, Illinois

(population 3,400,000; public school enrollment 535,000)

From its downtown "loop" area, Chicago stretches ten miles north and ten miles south along the western shore of Lake Michigan, extending inland an average of seven miles. Industry and moderate to high density housing are freely interspersed over all sections other than the downtown "loop."

Administratively, the Chicago city school system is divided into three "Areas"--A, B, and C.* Area A was the initial target of the USMES effort.

Area A encompasses the densely populated area south of the downtown section, including what is often called the "south side." Easily identifiable neighborhoods exist, most characterized by one ethnic or racial minority. Most, but not all, housing is shabby at best and there are many areas which can only be described as total slums.

The Area staff includes an overall Curriculum Director and Curriculum Consultants for the various disciplines. The Area appears to be the highest level of administration with which principals and teachers routinely deal.

Area A operates 170 elementary schools, some continuing through grade 8, others passing students at a lower level into one of eight middle schools or upper grade centers. Most facilities are middle-aged to old and in moderate to poor repair. Security appears a frequent problem.

The city's central administration has recently, partially in response to public pressure, markedly increased the degree to which it holds principals accountable for the achievement in reading and computation skills of the students in their buildings. The school board has coordinately mandated the use by teachers of a rather complex system for monitoring student progress in these areas. Feeling is strong among principals and teachers that their priorities have clearly been set for them. Science instruction at the elementary level is not one of these priorities.

The school system recognizes the large proportion of Chicago students who cannot, or will not, function in traditional educational settings, and is attempting to address the problem with extensive use of para-professional and various types of special teachers. Thus, while the ratio of regular classroom teachers to students is quite high, in most schools the opportunity for considerable individual attention exists.

Area A of the Chicago school system appears in general a reflection of the community it serves. Resources, for the most part, are minimal and the problems, often accentuated by age, are many. Those actively working in the schools to break the cycle usually see the mechanism as including, if not being totally, mastery of basic skills. Somewhat ironically, one of their major on-the-job frustrations is a perceived over-formalization and institutionalization of this very mechanism.

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*While this report was in the final stages of preparation, major changes in the administrative organization of the Chicago system were affected by a new superintendent of schools. Among other moves, the "Area" structure herein described was abolished.

Models as Proposed

The two implementation strategies share several assumptions. Basic is "...in most schools systems, adoption of new programs is usually made at the district level. Large scale implementation depends almost entirely on district-wide financing, procedures, and administration" (USMES, 1973, p.7). Continuing, "the critical elements in the introduction of USMES curriculum units into a school would appear to be:

(1) Strong administrative support at both the school and the district level;
(2) Involvement of a substantial number of teachers in any particular school [5 or more?];
(3) Intensive initial training with the particular USMES unit to be taught, followed by periodic support;
(4) Availability of USMES-style Design Labs, including Design Lab staffing." (USMES, 1973, pp. 13-14)

The two implementation strategies proposed as following from these criteria differ principally in the mechanism used to train teachers in the use of the USMES program. The strategy proposed for Chicago, the "Chicago Model," called for the district to rely primarily on its own resources, staff, facilities, and reward system for the planning, teacher training, coordination, and general support of a wide-scale implementation. By contrast, the "Lansing Model" proposed the collaboration of the school district with a teacher training institution--in this case, Michigan State University (MSU)--in executing the implementation.

The following descriptions are drawn primarily from the final proposals to NSF for funding of the Chicago and Lansing models. The specific elements of the model for which a corresponding item appeared in the budget are followed by a designation of the source of funding: (D) district, (N) NSF-USMES, (M) MSU. No specific resources were budgeted for those elements with no designation.

The Lansing Model

Coordination

Coordination of the implementation effort was to be the shared responsibility of an USMES Regional Director external to the Lansing district and the Area Principal of the Lansing schools involved.

Training

Six of twelve schools in the Area administrated by the Area Principal, Mr. Warren Bailey, were to be identified as target schools. Approximately 50 teachers from these schools were to receive intensive training in a four-day workshop during August 1972 staffed by external USMES consultants.

The training would continue through the fall of 1972 as a Michigan State University course, meeting weekly at one of the Lansing schools, and conducted on a credit-granting basis by MSU staff. Teachers were to be compensated for two of the workshop days and to consider the other two as initial meetings of the course. All were expected to participate in the course during the fall. Continuation of the course was to be offered during the winter and spring of 1973. While not mandatory, it was projected that half of the 50 participating teachers would desire to continue the sequence and that additional teachers desiring to join the program could be accommodated at that point.

Specific Elements of the Model

Lansing School District Commitments

D1. Decisions relating to participation of individual schools were to be made by the teaching staffs of each school independently.
D2. A substantial number of the participating teachers were to use the program in their teaching during 1972-73.
D3. Participating teachers were to enroll in the fall MSU course.
D4. Design Lab space and staffing were to be provided in the target schools. (D)*
D5. One-tenth of the Area Principal's time was to be devoted to USMES coordination. (D) (N)
D6. Changes would be made in the area curriculum to insure that USMES units had an important role in the science, mathematics, and social studies activities.
D7. Space and facilities would be provided for summer workshops. (D)
D8. Stipends would be provided participating teachers for two days of workshops. (D)
D9. Off-campus increments to basic MSU tuition for all courses would be paid for participating teachers not applying credit to a master's degree program. (D)
D10. Space and facilities would be provided for all MSU courses.

Michigan State University Commitments

M1. A home base for Regional Coordinator and staff would be provided. (N)
M2. Off-campus teacher training courses as contracted for by participating school district would be conducted.
M3. Partial staffing would be provided for the summer workshops. (M)

USMES-NSF Commitments

N1. Tools and supplies would be provided to equip Design Labs at six target schools. (N)
N2. Complete sets of printed materials would be made available at each participating school. (N)
N3. The basic tuition for MSU courses would be paid for participating teachers. (N)
N4. Consultant expenses for the four-day summer workshop would be paid. (N)

*( ) Source of budget item.

The Chicago Model

Coordination

The USMES implementation effort in Chicago was to be coordinated jointly by (a) an USMES staff member based in Newton, Massachusetts, (b) Chicago administration officials, primarily the Assistant Superintendent of Schools for Curriculum and her staff, (c) the principals of the schools involved, and (d) the members of the Area Resource Team.

Training

A six-member Area Resource Team, containing both teachers and administrators, was to be trained during the summer of 1973 at the national USMES-RPW workshops at Michigan State University. This team was expected to become an in-district source of USMES expertise.

Twelve to fifteen schools were each to send approximately twelve teachers to a two-week workshop to be held in late August in Chicago for intensive training. The workshop was to be staffed by the Resource Team, external USMES consultants, and personnel from the USMES central staff. Participation was to be voluntary. During the year, participating teachers were to have met occasionally at inter- and intra-building meetings during the district's normal meeting times to discuss various aspects of the program. These sessions were to have been organized and conducted by members of the Resource Team.

Specific Elements of the Model

Chicago School District Commitments

D1. Commitment to USMES as a reasonable and attractive curriculum.
D2. Stipends or other forms of compensation to recompense teachers for attendance at the two-week workshop and follow-up meetings would be provided. (D) (N)
D3. Facilities for two-week summer workshop would be made available.
D4. Space would be allocated in each participating school for use as a Design Lab. (D)
D5. The cost of equipping one-half of the Design Labs to be established would be assumed. (D)
D6. The responsibility for finding and paying Design Lab Managers for the Design Labs as required would be assumed. (D)
D7. Videotape equipment would be provided for use at the two-week workshop and throughout the school year as needed. (D)
D8. Curriculum materials produced by the project as needed would be purchased at cost. (D)
D9. Permission would be granted to conduct evaluation activities in both USMES and control classrooms.
D10. Time during the summer and the school year would be allocated to those Chicago staff selected for the RPW team for teacher training and coordination activities. (D)
D11. Time during school years would be allocated to these teachers involved with USMES for periodic meetings.

USMES-NSF Commitments

N1. Supplies and equipment for one-half of the Design Labs would be provided. (N)
N2. Support of the staff for the two-week summer workshop would be available. (N)
N3. A portion of the basic expenses of the workshop would be assumed. (N)
N4. Coordination of the implementation effort by central staff personnel would be provided. (N)

Models as Practiced

The actual occurrences in Lansing and Chicago are described below. Specific elements of the model are mentioned only when a marked discrepancy was found between proposal and practice; all other commitments appear generally to have been met. An additional section describing subsequent events has been added for each experiment.

Lansing

During the spring of 1972 racial tensions reached the flash point in several Michigan cities. In an effort to avoid physical and/or legal violence, the Lansing district rapidly formulated a desegregation plan for its elementary schools to be effective in September. Two "cluster schools" were formed, each a four-building conglomeration of two outer belt and two core-city schools. Included in one of the clusters were two of the six USMES target schools and two schools with no apparent prior connection with or interest in USMES. Mr. Warren Bailey, formerly Area Principal in the target area, was named Head Principal of the four-building cluster. An administrative decision was made to add the two new members of the cluster to the implementation effort and drop one of the original six buildings. As of August 1, 1972, the target thus consisted of seven buildings, four of which were involved in upheaval due to desegregation, and two of which had not sought the program.

Coordination

During the 1972-73 school year, coordination of USMES activities in Lansing was handled by Dr. William Fitzgerald of MSU, a mathematics educator with considerable prior USMES experience and who was instrumental in setting up the implementation plan, and by Ms. Lucy Knappen, a Lansing teacher on temporary leave of absence. The district administrators seem to have been cooperative to their efforts.

Training

The USMES report of the four-day summer workshop lists 49 attendees from the seven target schools. Those from the four cluster schools had just completed a mandatory six-day workshop on various aspects of their new arrangement.

Credit was granted by MSU for the fall course to 50 persons: 44 from the target schools, three associated with the Lansing district but not at the target schools, and three of unidentifiable affiliation. An additional three teachers from the target schools are listed as withdrawing from the course at some time prior to its completion.

Credit for the winter MSU course was granted to 26 persons: 17 from the target schools including two with no prior training, five other Lansing affiliates, two from other school districts, and two unidentifiable.

Credit for the spring MSU course was granted to 30 persons: 14 from the target schools, all of whom had attended at least one of the previous courses, eleven other Lansing affiliates, three from other school districts, and two unidentifiable.

By September para-professional Design Lab Managers had been appointed in each building. A two-day workshop was held at that time to acquaint them with their duties.

Specific Elements of the Lansing Model Showing Discrepancies Between Proposal and Practice

D1. (Decisions relating to the participation of individual schools were to be made by the teaching staff of each school independently.) All teachers at the two schools added to form the cluster were in effect drafted into the program on extremely short notice.

D5. (One-tenth of the Area Principal's time was to be devoted to USMES coordination.) There is no evidence that the Head Principal of the cluster, the Area Principal of the non-cluster buildings, or anyone else in the district or administration, devoted one-tenth of his time to USMES during 1972-73.

D6. (Changes would be made in the area curriculum to insure that USMES units had an important role in the science, mathematics, and social studies activities.) Some attempt was made to standardize curricula and opportunities among the cluster schools. There is no indication, however, that USMES was ever given primary rather than supplemental status anywhere in the district, with the possible exception of among the development teachers at the Allen Street Elementary School, a school not part of the implementation target. (see p. 11)

N1. (Tools and supplies would be provided to equip Design Labs at six target schools.) A seventh Design Lab was also equipped.

Subsequent Events

Dr. Fitzgerald was away from Lansing during 1973-74. During that time, coordination of USMES activities from the university's side was handled by Dr. John Masterson. Dr. Fitzgerald, upon return, did not resume his close affiliation with the program, and Dr. Masterson has become the university figure most associated with the implementation effort.

The university has persisted in offering, from time to time, USMES training as part of its normal teacher training program, both in general workshops and as part of an individualized master's degree program.

In response to a perceived decline in USMES use, the Lansing district administration--particularly the District Math Coordinator, Mr. Frank Rogers, and the Director of Elementary Education, Ms. Eva Evans--promoted USMES during 1973-74 via a one-day informational meeting for principals and a two-day workshop for teachers. During this period, also, an "USMES Mini-View"--a 37-page volume presenting an optimistic viewpoint on the Lansing experiences, and suggestions for USMES use--was produced by Lansing teachers.

There appears to exist in the district a small yet persistent group of teachers, most from the Allen Street School, who are themselves quite satisfied with the merits of the USMES program and who are constantly encouraging others to use it. They have run at least one halfday meeting of teachers during 1974-75, at which representatives of the USMES central staff were present. This group seems to want to foster USMES but at this time is at a loss for what to do.

Chicago

Unlike Lansing, the Chicago target area remained essentially unchanged between the planning period and the initiation of the implementation effort.

Coordination

Very little coordination for the Chicago implementation effort in Area A, both the general planning and the day-to-day details, appears to have occurred. Some leadership was provided by the USMES central office, but the expected sharing of coordination by the Assistant Superintendent for Curriculum's office, the building principals, and the Resource Team never materialized. Team members generally interacted only with teachers in their own buildings, and even this was usually in reaction to a specific inquiry or request. Most principals ranged from antagonistic to tolerant of the USMES activities in their schools, with only a few known to seriously promote the program to their staffs. USMES appears to have been rarely discussed during inter-principal communication. Teachers and principals were in full agreement that they received little, if any, interest in USMES on the part of the city system's administration. Almost all users seemed to have been in much closer contact regarding USMES with the central staff in Massachusetts than with anyone in Chicago in a building other than their own.

Training

A six-member Resource Team, including administrative and teaching representatives, was trained as proposed.

During late August 1973, a two-week workshop was conducted at the Dyett School, an Area A facility, in which 84 Area A teachers received training. The training was staffed by the six Resource Team members and 31 external agents, either USMES central staff members or consultants, as detailed in the USMES report of the workshop. The trained teachers represented 24 different schools, with seven schools having five or more teachers in attendance.

A second workshop series was held on three Saturday's during November and December of 1973 to provide training for additional elementary teachers in the Area. There were 47 new teachers trained, including 15 from five schools unrepresented at the summer sessions. Two teachers who had been at the summer sessions also attended. The report indicates staffing by the Resource Team and five external agents. Following this training, there were 29 buildings in Area A with at least one USMES trained teacher, eleven with five or more.

Specific Elements of the Chicago Model Showing Discrepancies Between Proposal and Practice

D4. (Space would be allocated at each participating school for use as a Design Lab.) This was not always done. At one school with 19 trained teachers (Bryn Mawr) the provided facility was a half-size washroom with fixtures removed.

D5. (The cost of equipping one-half of the Design Labs to be established would be assumed.) The district may have been willing to assume the cost, but for some reason (bureaucratic ineffectiveness) the materials were never ordered. The fiscal year expired and whatever monies had been set aside were returned to the general fund. As a result, those building which were to have district-financed Design Labs received nothing until at least January 1974. Some have yet to be equipped.

D6. (The responsibility for finding and paying Design Lab Managers as required would be assumed.) Principals, perhaps in some schools influenced by the delay in equipment, did not appear to see this as being a high priority position to be filled from their available discretionary staff. When a manager was appointed, he often had other duties such as building security guard which prevented adequate functioning. There are schools, however, in which this commitment was well met--Ray School being one example.

D10. (Time during the summer and the school year would be allocated to those Chicago staff selected for the RPW team for teacher training and coordination activities.) This was not done. One Resource Team member reported being released one-half day during 1973-74 despite frequent requests for additional time.

D11. (Time during school years would be allocated to those teachers involved with USMES for periodic meetings.) The sparcity of meetings, due perhaps to the problem in D10 above, never really caused this commitment to be exercised.

Subsequent Events

USMES activity has begun in the remaining two Areas of the Chicago system, Areas B and C. During the spring of 1974, each formed a Resource Team which was sent to an RPW for training.

During August 1974 a two-week teacher training workshop was conducted at the John Hope School of Area B. Ninety-six teachers were trained, including 14 from Area A. The workshop had a staff of approximately 30, with roughly equal reqpresentation of district personnel and external agents.

During January of 1975 a training workshop was held for four days at the Ray School in Area A, which resulted in 15 additional USMES trained teachers in the Area.

A Comment

One cannot help but notice the many important discrepancies between the planned and actual implementation components. A number of key commitments were not met, especially those on the part of the districts. These marked deviations between what was and what should have been must be considered as the outcomes of the implementation are discussed in the next section.

IV. OUTCOMES

In this section we examine the actual Chicago and Lansing implementation projects in terms of their impact on the districts; that is, what outcome information is available that indicates the delivery systems were effective in accomplishing their objective of implementing USMES into the classroom. Several criteria were selected as outcome measures. These measures include:

(a) Teacher satisfaction with the training
(b) Usage rates
(c) Persistence of implementation
(d) Costs
(e) Judgments of effectiveness using an idealized dissemination model
(f) Questionnaire results

Data were gathered for each criterion for both the Lansing and the Chicago efforts. These data were analyzed and then compared with data available on five different implementation projects funded by NSF. These projects (called delivery systems) were evaluated by the Minnesota Research and Evaluation Project in 1974 and form a comparison group for the present study. The comparison group of delivery systems was used to implement a variety of curricular programs, e.g., BSCS, modules in elementary math, SCIS, and junior high science demonstrations. In the case of two systems, several different curricular messages were disseminated. We are uncertain as to the interaction between the delivery system and the message, as well as the effects of varying characteristics of the senders and the receivers.

Our professional opinion is that an effective delivery system will recognize variations in messages and receivers and concentrate on procedures designed to counteract these problems. Thus, in evaluating a particular delivery system, we looked at outcomes independent of the particular message being transmitted. However, we must recognize that expected outcomes may vary across curricula and across receivers.

A brief description of the five comparison delivery systems follows (Welch and Willson, 1975).

Comparison Group

The five delivery systems are examples of what Havelock, et al., (1973) term "temporary systems for promoting change." These systems are differentiated by six characteristics: users, location, time of instruction, instructors, instructional responsibility, and school district support.

The purpose of all five systems was to train teachers to use new curriculum materials in their schools. A common reward was provided in all five systems. Teachers who participated received graduate level credits from a university associated with the system. In most cases, teachers also received tuition support and some travel allowance.

The first delivery system to be discussed in the Portal School. Instruction was given to groups of elementary or secondary school teachers, usually from the same school or district. The classes met weekly after teaching hours at a local school for approximately one semester. Instructors were themselves elementary or secondary teachers who had attended training sessions at the sponsoring university and had been certified. School districts supported the Portal School by providing meeting sites, some materials, and in some cases tuition costs which were otherwise borne by teachers. Districts made commitments with the sponsoring university to implement the curriculum studies.

The Accessible School delivery system was of a semester's duration with meetings once a week in the evening at a local junior college. Classes were taught by junior college instructors who had previously attended short training sessions at the sponsoring university. The teachers taught at local junior high schools. However, there was no district level participation.

The Off-Campus Center delivery system provided semester-long instruction for secondary teachers. Classes met weekly at night in a local school which was provided by a cooperative school district. Instructors were themselves secondary teachers who completed a master's level program at the sponsoring university. Teachers' school districts allowed the use in schools of curricular materials developed or discussed at the Off-Campus Centers, but the districts provided no financial support.

Another delivery system is represented by the Summer Workshops conducted at a sponsoring university. Each workshop presented one curriculum, and each lasted two weeks with eight hours of instruction and laboratory work per day. Instructors were university faculty, and in several workshops secondary teachers were hired as assistant instructors. No school district commitment was made concerning curriculum implementation.

The final delivery system to be discussed is a cooperative type workshop. One or two teachers in several districts were trained at the sponsoring university as resources in the curriculum to be implemented. Local workshops for teachers were conducted by instructors, expert in the curriculum prior to the beginning of the school year. During the year periodic classes were held for teachers, in which university personnel participated. School districts which participated agreed to implement the curriculum.

The Lansing project is similar to the foregoing in the sense that university credit is granted to participants in the training. Major unique components of the Lansing project included:

(a) Single large city school system;
(b) Strong curriculum development staff (USMES) involvement;
(c) Substantial district financial involvement;
(d) NSF funding directly to the district.

The Chicago project represents a substantial departure from the comparison group in that the district sponsored the training and no university credit was given to teachers who attended the training sessions. However, teachers were paid to attend the two-week summer workshop and the subsequent information sessions.

In the sections that follow, data are presented for each criterion. Possible interpretations of the results are provided in the narrative.

Participant Satisfaction Ratings

Participants in all delivery systems were asked to express their reactions to the experience. The comparison figures reported in Table 1 are the percentages of teachers who expressed a favorable reaction to the workshop. The exact question asked varied somewhat for each delivery system, but typically the question was: Rate the overall effectiveness of the workshop on the following scale--5 = excellent, 4 = good, 3 = satisfactory, 2 = some improvement needed, 1 = much improvement needed. A positive response was given for a 3, 4, or 5 mark. The questionnaire was given shortly (within six months) after completion of the training program. We note a very positive mean response on the part of teachers for the comparison group, 94% satisfied.

(Insert Table 1 here)

Participant satisfaction for the USMES projects was assessed in a slightly different way, so this particular comparison must be viewed with caution. The question was, "Do you now feel that the workshop prepared you adequately to teach USMES? (Yes) (No)." Furthermore, the item was given two years after the training. This may explain in part the lower response for Lansing (58%) and Chicago (66%). Unfortunately, we do not have follow-up data for the comparison group.

Questionnaires administered immediately following the Lansing workshop showed 48% (16/33) felt adequate to begin teaching USMES. In Chicago, only 33 of 87 questionnaires were returned and of these 70% expressed a positive response to the training. These figures are very similar to the responses given two years later.

Thus, the perceptions of teachers do suggest some perceived limitations in the workshop experience. Further information on participant satisfaction is presented in the Questionnaire Results section.

Table 1

PARTICIPANT SATISFACTION RATINGS

for Seven Delivery Systems

Delivery System	Rating*	N#
USMES		
Lansing Model	58%	45
Chicago Model	66%	95
COMPARISON GROUP		
Accessible Schools	100%	49
Collaborative	90%	39
Off-Campus Centers	90%	79
Portal Schools	98%	331
Summer Workshops	93%	56
Mean	94%	554

*Percent of teachers expressing favorable reaction to the training

#Number of responders to questionnaire

Usage Rates

Among the most important, if not the most important, criteria for an implementation workshop is the percentage of teachers who actually use the new program following the workshop. First year adoption rates for the USMES projects and the five comparison projects are presented in Table 2. Use rates are defined as the percentage of teachers who report using the new program the year following the training.

(Insert Table 2 here)

There was some variation in the content (message) of the delivery systems. The Collaborative Project, Portal Schools, and Summer Workshops all trained teachers in various NSF supported alphabet curricula (e.g., SCIS, ESS, BSCS). The Accessible Schools were presenting inexpensive lab and demonstration materials for junior high schools, while the Off-Campus Centers concentrated on instructional modules (e.g., the metric system) for mathematics.

Insofar as these data, to our knowledge, are the only ones available on usage rates, it seems reasonable to consider 70% an acceptable norm. Thus, the Lansing project achieved satisfactory results the first year, while the Chicago project was far less successful.

Persistence of Adoption

Not only is a delivery system considered successful if a fair number of teachers accept the message, but also the innovative change must last more than one year. A concept called "persistence of innovation" was created for this study and is defined as the percentage of adoptors who use the new curriculum (USMES) a second year. An implementation model is considered to be successful if adequate support is available to persuade teachers to continue to use the innovative program. This support, coupled with the teachers' one-year experience with the new curriculum, interacts to yield the persistence figures reported in Table 3.

(Insert Table 3 here)

Unfortunately, for this evaluation, the Minnesota Research and Evaluation Project (MREP) has persistence data for only two of the five comparison systems--the Portal School and the Off-Campus Centers. The Portal School figure, 82%, is the mean of persistence for three different years and, therefore, does represent a fairly stable figure for this one delivery system.

Although the Lansing model faired quite well on usage rates, its 37% persistence rate is not very encouraging. The two-year persistence rate is even more disappointing, as only 26% of the adoptors were using USMES in 1974-75, three years after the initial 1972 workshop.

Table 2

USAGE RATES - FIRST YEAR

for Seven Delivery Systems

System	First Year Use Rate
USMES	
Lansing Model	84%
Chicago Model	35%
COMPARISON GROUP	
Accessible Schools	84%
Collaborative Project	96%
Off-Campus Centers	67%
Portal Schools	48%
Summer Workshops	51%
Mean	69%

Table 3

PERSISTENCE* OF ADOPTION

Three Delivery Systems

Delivery System	Persistence
USMES - Lansing	37%
USMES - Chicago	64%
Portal School#	82%
Off-Campus Centers	71%

*Percentage of adoptors who use the curriculum a second year

#Data from three different years.

The data in Chicago represent a different phenomenon. While initial adoption was quite low (35%) nearly two-thirds of this group continued into the second year with USMES. This suggests a few strongly committed teachers who made a major decision to use the program the first year (1973-74) and this individual commitment carried over into the second year (1974-75). We shall point out later other evidence to suggest that personal commitment to USMES operated more effectively in Chicago than did any kind of district commitment.

The Portal School program had a persistence rate of 82%, while the Off-Campus Centers rate was 71%. The former was implementing NSF curricula on a building basis, while the latter was concerned with rate of use of teacher developed math units.

Thus, it appears reasonable to conclude that neither district project was particularly effective in providing the support nor incentive for continued usage of the USMES curriculum.

Usage Rate by Building vs. Number of Trained Teachers

It was stated by the developers of the USMES implementation strategies (see page 13) that a major consideration in the design was a desire to involve (train) a "substantial number of teachers" in each targeted school. The underlying assumption appears to be the belief that, as the size of the corps of USMES trained teachers in a building increases, the probability that any particular teacher will initiate and maintain usage of USMES increases. Such an assumption implies, for example, that greater total USMES usage could be expected by training eight teachers each from three schools than by training two teachers each from twelve schools. Under the assumption, the probability of use function is relatively unspecified save that it is generally increasing. It has been suggested (West, 1975) that there may be a "critical mass" of trained teachers, a point at which the probability of use function rises dramatically.

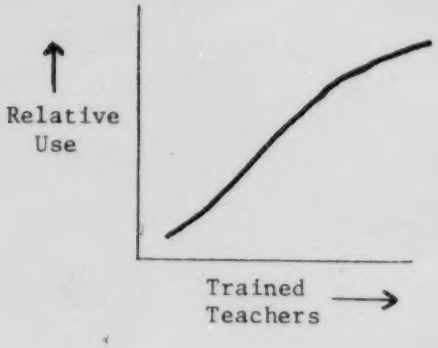
We may define for a building and a given year the variable RELATIVE USE as:

$$\text{RELATIVE USE} = \frac{\text{\# teachers using at least one USMES challenge}}{\text{\# USMES trained teachers in building}}$$

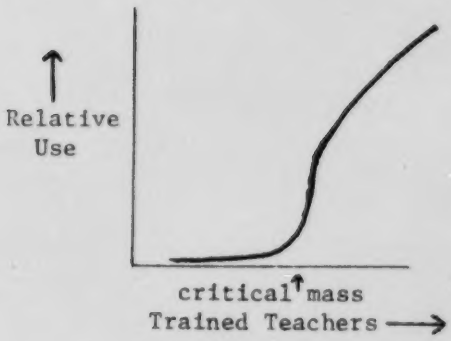
Relative use for a building is then formally equivalent to the probability of use for any random teacher.

Relative use may be plotted against the number of trained teachers working in a building. Under the assumption, one would expect a generally increasing function, perhaps like example one; if a "critical mass" threshold existed, the function might appear more like example two:

Example One



Example Two



For the two USMES implementations, relative use for each building for each year was estimated as:

$$\text{RELATIVE USE (estimated)} = \frac{\text{\# teachers responding as using at least one USMES challenge}}{\text{\# teachers in building returning questionnaires}}$$

Under the assumption of unbiased response to the questionnaire, this provides an unbiased estimate of RELATIVE USE.

Following are plots of RELATIVE USE VS. TRAINED TEACHERS IN THE BUILDING for each year in the two cities. Each dot represents one building; when more than one building occupies a set of coordinates, a numeral indicates the number of buildings involved. The number of trained teachers in a building was derived from USMES Workshop Reports and MSU class lists corrected for known transfers, retirements, etc. Buildings in Chicago from which no questionnaires were returned are not included.

(Insert Figures 1, 2, 3, here)

The Chicago data provide some substantiation for the assumption in that most non-user buildings have few trained teachers. A hint of a "critical mass" as low as three may be seen. The data may be somewhat misleading, however. Those buildings eliciting higher relative use are also frequently those who received USMES (NSF) supported Design Labs (see page 19, D5). Since inavailability of physical materials was a frequently cited reason for non-use, it is possible that the higher relative uses are a result of the availability of materials rather than the number of trained teachers in the building.

The Lansing data exhibit no relation between relative use and number of trained teachers. Here teachers in all buildings had approximately equal access to materials, at least during Year I (72-73). It is noted that all buildings had five or more trained teachers and, thus, any thresholding at lower levels would be undetectable.

No data are available for comparison groups relative to this issue.

Figure 1

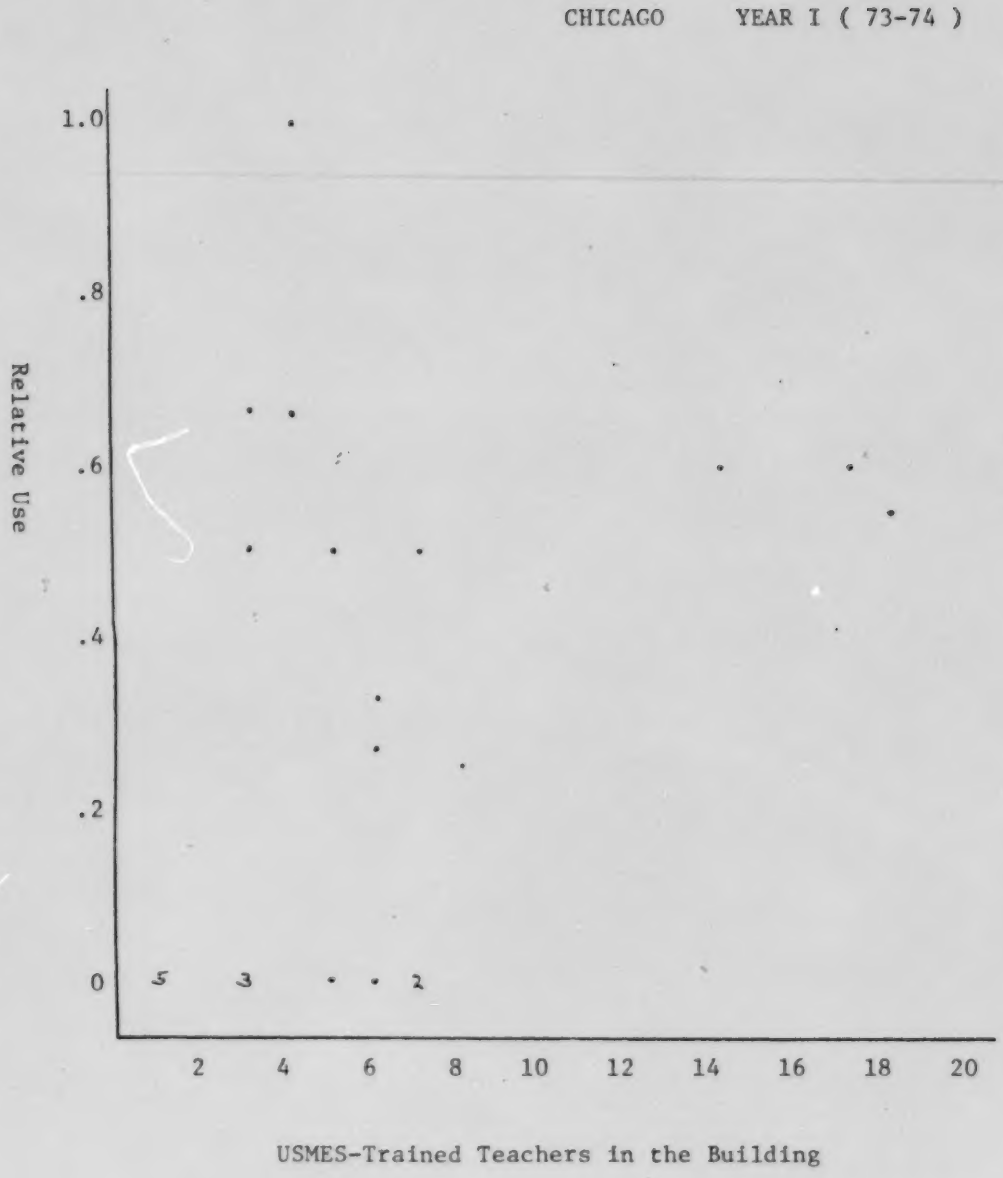

CHICAGO YEAR I (73-74)
1.0
.8
.6
.4
.2
0
Relative Use
5
3
2
2
4
6
8
10
12
14
16
18
20
USMES-Trained Teachers in the Building

Figure 2

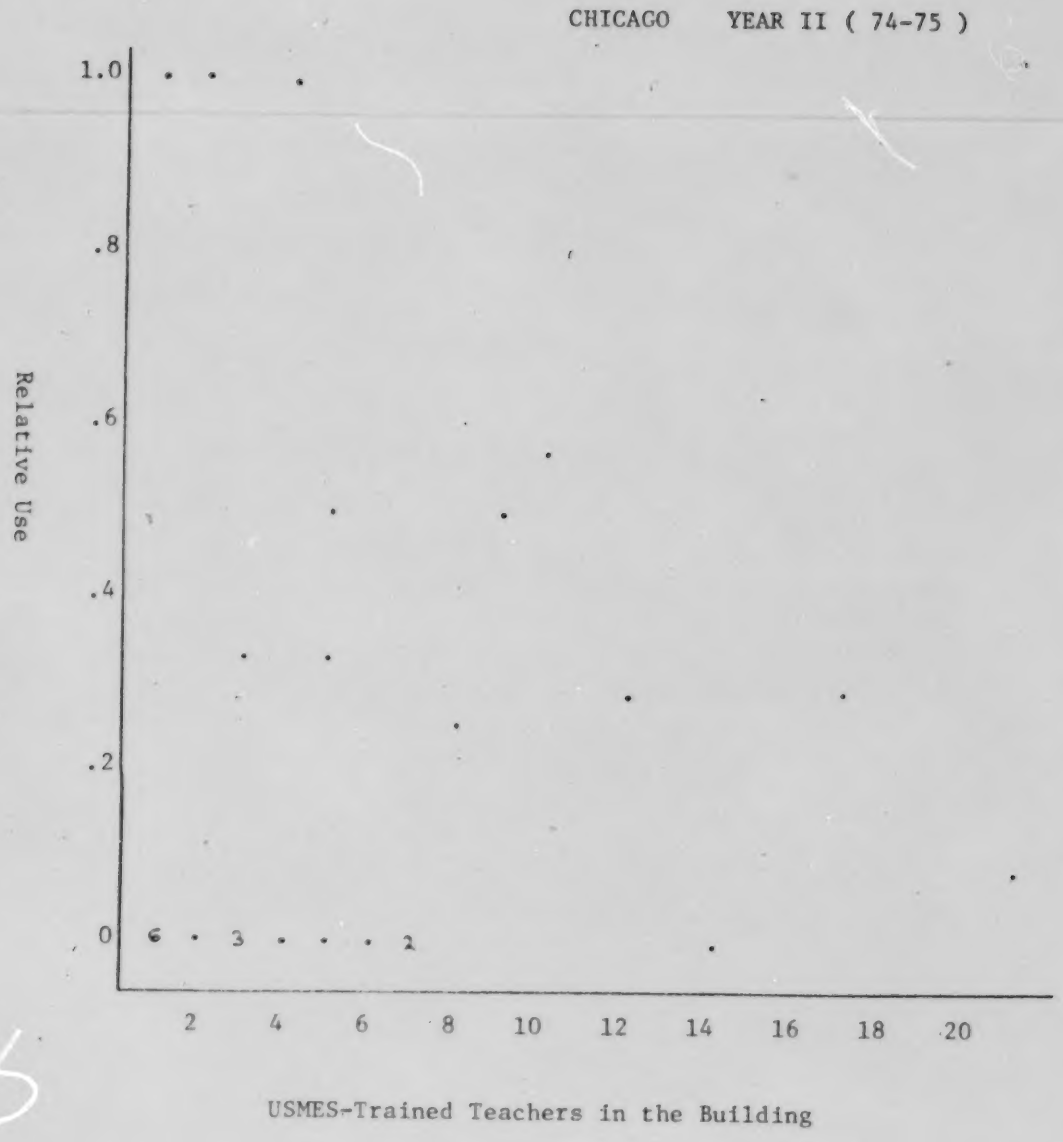
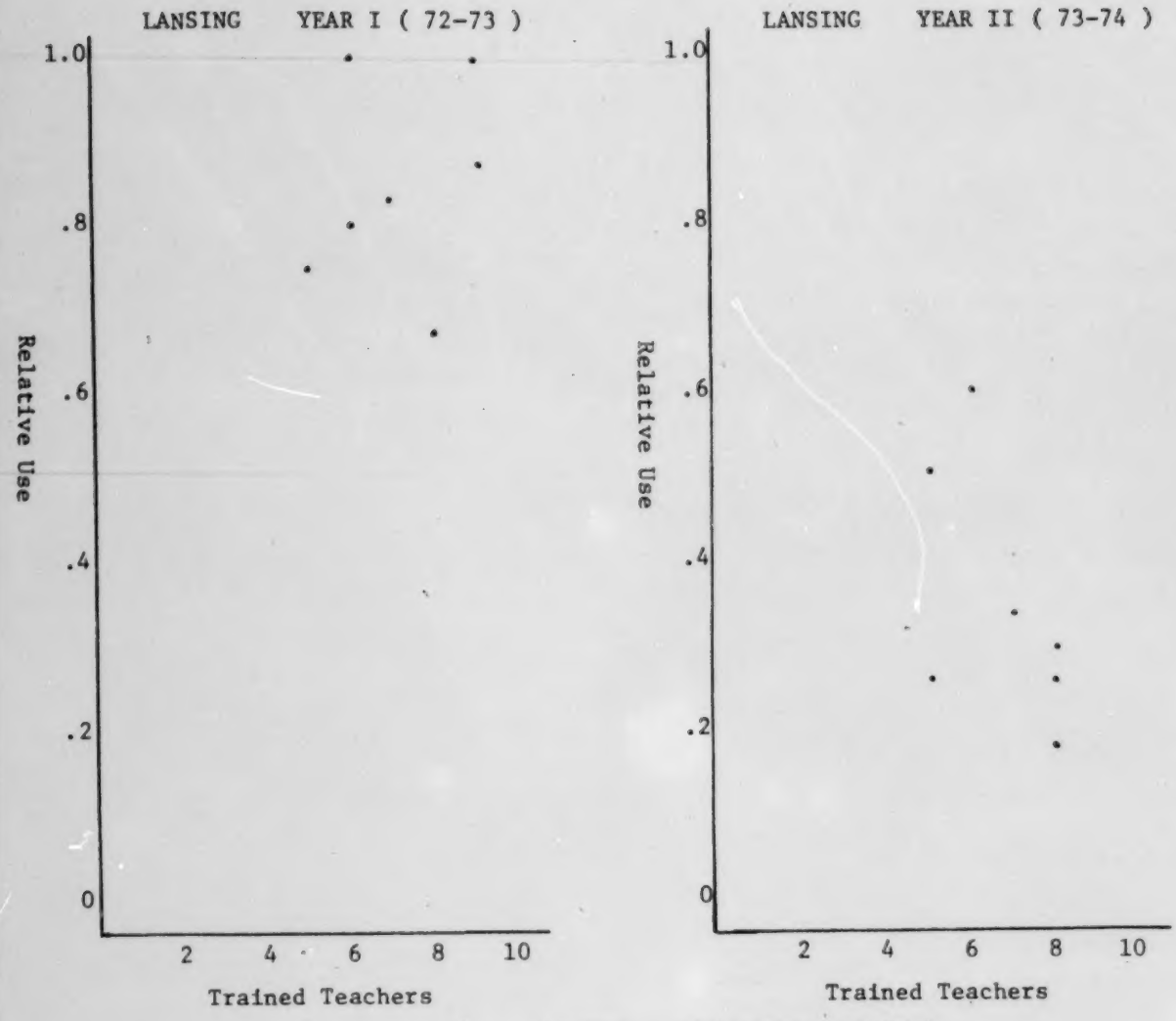
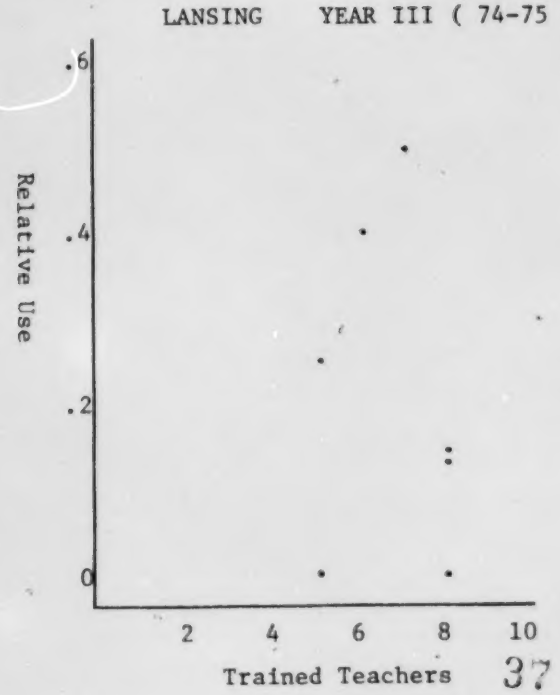

CHICAGO YEAR II (74-75)
1.0
.8
.6
.4
.2
0
Relative Use
6
3
2
2
4
6
8
10
12
14
16
18
20
USMES-Trained Teachers in the Building

Figure 3


LANSING YEAR I (72-73)
1.0
.8
.6
.4
.2
0
Relative Use
2
4
6
8
10
Trained Teachers
LANSING YEAR II (73-74)
1.0
.8
.6
.4
.2
0
Relative Use
2
4
6
8
10
Trained Teachers


LANSING YEAR III (74-75)
.6
.4
.2
0
Relative Use
2
4
6
8
10
Trained Teachers

Cost Analysis

An important, yet often ignored, part of program evaluation is program cost. This is especially true for programs supported by the taxpayers. In order to provide some fiscal accountability for the two implementation models, a detailed cost analysis was carried out. This cost analysis focused specifically on direct costs absorbed by NSF, the districts, and in the Lansing case, Michigan State University.

A summary of the cost analysis for the Lansing project is found in Table 4.

(Insert Table 4 here)

The total estimated cost of the Lansing project was $90,551 of which $26,588 was used for USMES documentation and evaluation. NSF supported the documentation and evaluation costs in addition to providing $28,653 for implementation costs (see Appendix A). It seems appropriate to consider only the costs directly attributable to implementation when providing information on the project. Thus, the total cost for training 66 teachers is $63,963 with Lansing and NSF providing the major shares of this cost. (Cost data were obtained from budget for Grant W007626.)

A supplemental grant of $12,970 was also made for the Lansing experiment in 1973-74 (see Appendix B). However, these costs were entirely used for documentation and evaluation. (It is our understanding that part of these funds were used to support the present study.)

The main facts of Table 4 are these. At a cost of $28,653 the NSF, through USMES, was able to provide 66 Lansing teachers a total of 3,768 hours of instruction in teaching USMES. This yields a cost of $7.60 to NSF for each teacher training hour.

Because 56 of the teachers used USMES the first year and reached 1,502 students, we computed a cost to the Foundation of $19.07 per each student exposed to an USMES trained teacher. Of course, because some of these teachers will reach more students in subsequent years, the amortized cost per pupil will decline. For example, total students reached by trained USMES teachers over three years of the project numbered 2,490 at a per pupil cost to NSF of $11.51.

Costs associated with the Chicago project are shown in Table 5.

(Insert Table 5 here)

In the Chicago district-centered project, implementation costs totaled $155,532 with NSF providing 38% of the total (see Appendix C). An additional $20,093 was spent by NSF for documentation and evaluation, but these costs are not included in this cost analysis because another district considering this project would not require these extra expenditures.

Table 4

COST ANALYSIS

Lansing

Teachers Trained:* 66

Questionnaire Responders:# 45

Mult factor for estimation = 66/45 = 1.467

Total Implementation Costs	$34,310.00 - District $1,000.00 - MSU $28,653.00 - NSF $63,963.00 - Total
Cost/Teacher Trained	$519.85 - District $15.15 - MSU $434.14 - NSF $969.14 - Total
Total Training Hours	3,768
Cost/Teacher Training Hour	$9.11 - District $.27 - MSU $7.60 - NSF $16.98 - Total
Use: Estimated Teachers Using First Year	56
Use: Estimated Students Exposed First Year	1,502
Cost/Student Exposed First Year	$22.84 - District $.67 - MSU $19.07 - NSF $42.58 - Total

*Trained includes 17 from schools other than the target 7. The 66 represent the sum of teachers trained as a direct result of Grant W007626.

#Assume the responses constitute a random sample of the teachers trained.

Table 5

COST ANALYSIS

Chicago, Area A

Teachers Trained:* 164

Questionnaire Responders: 95

Mult factor for estimation = 164/95 = 1.726

Total Implementation Costs	$96,101.80 - District $59,430.00 - NSF $155,531.80 - Total
Cost/Teacher Trained	$585.99 - District $362.38 - NSF $948.37 - Total
Total Training Hours	7,482
Cost/Teacher Training Hour	$12.84 - District $7.94 - NSF $20.78 - Total
Estimated Teachers Using First Year	62
Estimated Students Exposed First Year	1,898
Cost/Student Exposed First Year	$50.62 - District $31.30 - NSF $81.92 - Total

*Assumptions:

Responses constitute a random sample of teachers trained at:

Resource Personnel Workshop (RPW), MSU, Summer 1973
Chicago, Dyett School, Summer 1973
Chicago, Ray School, Fall 1973
Chicago, Hope School, Summer 1974
Chicago, Ray School, Winter 1975

The training at Hope School, Summer 1974, and Ray School, Winter 1975, were funded by the Chicago district and/or external sources other than NSF Grant W007626 002 at a cost estimated per participant-day equal to the Dyett School training of Summer 1973 ($61.94). The additional estimated cost of training Area A teachers of $13,626.80 is herein assigned to the district.

"First Year" for teachers trained through the Fall Ray School workshop of 1973 is 1973-74. "First Year" for the 29 additional teachers is 1974-75.

District costs are based on budgeted amounts rather than actual expenditures. Because the district did not meet all its commitments, e.g., Design Labs and managers, budgeted amounts are likely to exceed expenditures. However, the latter were not readily available to us. In fact, it is doubtful if actual expenses could be retrieved from the complex Chicago financing system. Because we are primarily concerned with NSF costs, the following facts are of interest.

The NSF grant stimulated the training of 164 Chicago teachers at a cost of $7.94 per teacher training hour. Because an estimated 62 of these teachers used the materials, 1,896 children were exposed to the USMES challenges. Cost to NSF was estimated at $31.30 per student, a figure somewhat higher than Lansing because of the lower usage rate.

Since a number of teachers (39) used the materials for a second year, the amortized NSF cost for two years drops to $21.78 per student exposed.

In order to place some value on the cost data obtained for the USMES models, comparison data for other NSF supported delivery systems were obtained. Again, these data were gathered as part of the effort of the Minnesota Research and Evaluation Project. Table 6 presents this comparison.

(Insert Table 6 here)

The cost per teacher participation hour is near the mean ($7.80) of the comparison group, suggesting the USMES district projects are no more nor less costly than most NSF supported programs. This result was somewhat surprising because of the high teacher-staff ratios at the initial workshop sessions. Because of the low cost follow-up sessions in both cities, the mean cost drops to the average of the group.

USMES does not fare so well in the cost per student exposed because of the relatively low use and persistence rates. Except for the expensive Off-Campus Centers, the USMES projects as implemented are rather costly in terms of impact on students.

A final comment on the cost analysis concerns the relationship between cost and usage rates. If greater expenditures produced greater usage, then the more expensive projects might be justified. Below are plotted delivery system costs with corresponding first-year usage rates.

(Insert Figure 4 here)

No strong linear relationship appears to exist between expenditures (cost per teacher training hour) and usage rates. Evidently, other factors account for the marked variation in usage rates. This point will be discussed later in the report.

Table 6

DELIVERY SYSTEM COST ANALYSIS

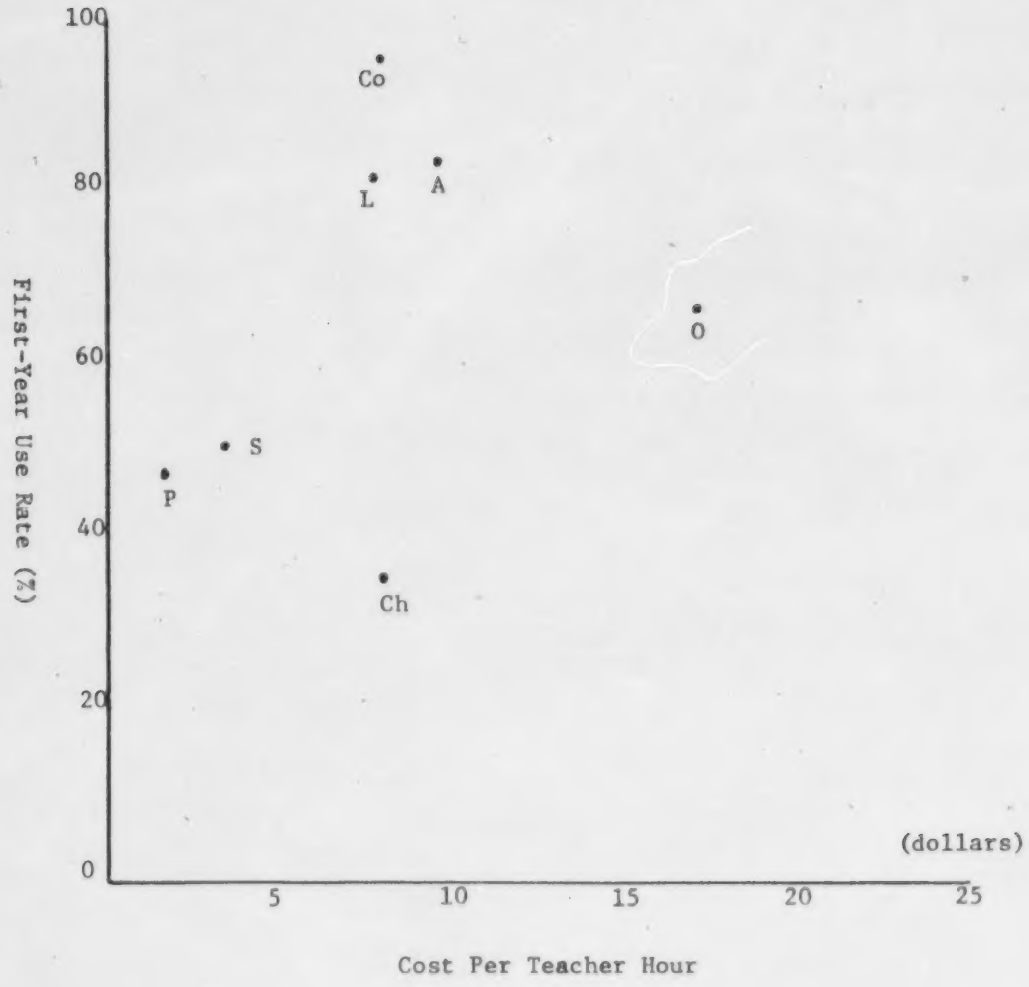
Criterion	USMES		Comparison Delivery Systems				
	Lansing	Chicago	Accessible	Off-Campus Centers	Collab-orative	Portal School	Summer Workshops
Number of Teachers	66	164	234	75	92	1906*	61
Estimated NSF Cost	$28,653	$59,430	$100,000	$115,126	$27,348	$88,030	$15,527
Hours of Instruction	57	46	45	90	38	32	80
NSF Cost Per Teacher Partic-ipation Hours	$7.60 (17.00)#	$7.90 (20.80)	$9.50	$17.10	$7.80	$1.50 (4.90)	$3.20
Cost Per Pupil	$19.10	$31.30	$6.20	$35.90	$14.10	$2.30	$6.70

*This figure represents teacher semesters; approximately 13% of the teachers attended more than one workshop

( ) Total costs--NSF, district, and university

Figure 4

Delivery System Cost



KEY:

A = Accessible
Ch = Chicago
Co = Collaborative
L = Lansing
O = Off-Campus Centers
P = Portal School
S = Summer Workshops

Judges Ratings

In a recent paper, Welch and Willson (1975) described a new technique for assessing implementation projects sponsored by NSF. The technique uses judges' ratings of the degree to which the delivery systems incorporate seven general factors related to successful knowledge dissemination and utilization. This procedure is based upon a model recently proposed by Havelock, et al., (1973). The model portrays the implementation process as an interaction or linkage between a potential "user" and a potential "resource." The purpose of the linkage is a transfer of knowledge. It can be analyzed into five categories by the question: "Who says what to whom by what channel to what effect?" This question is applied to the current problem in Figure 5.

Figure 5

Knowledge Transfer in USMES Implementation Models

WHO	transfers WHAT	by what CHANNEL	to WHOM	to what EFFECT
School District /EDC	USMES	Varies by delivery system	Science teachers, schools	USMES use

It should be noted in Figure 5 that the "channel" for implementation varies in the Lansing and Chicago projects. In one instance, it is a one-week summer workshop followed by six halfday sessions at a local college; in another it is a two-week summer workshop sponsored by the local district. Both projects have built in follow-up support (either a local resource team or university support) and both placed considerable reliance on obtaining assistance from the USMES office.

Havelock has found that seven general factors appear to account for or are related to effective knowledge dissemination and utilization. By applying these seven factors (criteria) to the delivery systems, a clearer picture of the strengths and limitations of the systems should be available.

Comparison Group

Five different delivery systems were the focus of the original MREP study mentioned above. All projects were funded by NSF and are typical of the implementation program started by the Foundation in 1973. A series of on-site visits, interviews, observations, and questionnaires were used to describe the major characteristics of each delivery system. These characteristics were summarized in a series of reports prepared for projects directors and NSF and are the basis of the comparison group data in this paper.

A panel of nine judges read each report and gained familiarity with each project through a series of staff discussions which occurred periodically throughout the life of the evaluation. These judges were then asked to rate each delivery system against the seven factors proposed by Havelock, et al.

The two evaluators for the USMES projects were judges in the original study and applied the same procedure to the Chicago and Lansing projects. Independent ratings were made in May and again in August. The reported results are the means of these ratings.

Dissemination and Utilization Factors

Based on a review of nearly 4,000 studies of the dissemination and utilization process (D&U) Havelock and his associates have proposed seven general factors which account for most D&U phenomena. In Table 7 a brief description is provided of each factor as it relates to the medium through which knowledge is communicated. In the current study, the medium is called a delivery system.

(Insert Table 7 here)

A five-point rating scale was used to rate each delivery system on each of the seven D&U factors. The anchor descriptions for each point were:

5 - uses to fullest extent
4 - system permits a substantial amount
3 - typifies somewhat
2 - little more than chance
1 - creates a negative situation

The mean ratings for the comparison group and the two USMES projects are shown in Table 8.

(Insert Table 8 here)

We note a remarkable similarity between the Lansing project and the means of the five comparison models. All are somewhat similar in that they have a college or university component. Lansing is rated somewhat higher on proximity because of the nearness of MSU to Lansing and the relative ease of meeting in the schools and at the university. On the six other factors, no marked discrepancies are noted.

The Chicago project did not fare so well in the opinion of the judges except for the proximity rating. It was judged significantly lower on five factors and its overall rating of 2.54 is the lowest of the seven systems for which we have data. Although our possible university bias must be considered, the Chicago system as implemented appeared to have several shortcomings. These included (see Table 7):

Table 7

Brief Description of D&U Factors*
Specific to Medium

1.	Linkage	- allows direct contact; two-way interaction; compatible with experience and style of sender and receiver.
2.	Structure	- systematic strategy; timing to fit user's problem-solving cycle; careful attention to the anticipation and management of the change process.
3.	Openness	- flexible strategies; best medium allows informal communications between sender and receiver about the innovation; must allow for alteration or adjustment for unanticipated user reaction.
4.	Capacity	- capacity of medium to carry maximum information; accessibility to maximum number of users in minimum time; power to influence the potential user.
5.	Reward	- medium which can convey feedback to sender and receiver (+ and - reinforcement); most effective medium has best reward history for sender and receiver.
6.	Proximity	- easily accessible medium, familiar to the user; provides opportunity for user to move in and out of his home community and make contact with outside groups.
7.	Synergy	- the number and diversity, continuity and persistence of different media used to transmit the message; continued and varied effort by sender.

*Havelock, et al. 1973, pp. 11-22.

Table 8

DELIVERY SYSTEM RATINGS

Dissemination and Utilization Factors

Factor	Mean of Five Systems	Lansing	Chicago
Proximity	3.51	4.00^{+}	4.00^{+}
Capacity	3.31	3.50	2.00^{-}
Structure	3.29	3.00	2.75^{-}
Linkage	3.18	3.50	2.50^{-}
Reward	3.07	3.00	1.25^{-}
Openness	2.82	2.75	3.00
Synergy	2.78	2.50	2.25^{-}
Grand Mean	3.14	3.18	2.54

$^{+}$Strength ($\geq$.50 above mean)

$^{-}$Limitation ($\geq$.50 below mean)

(.50 is approximately 2/3 standard deviation)

(1) Capacity--failure to use the power to influence users;
(2) Structure--limited attention given to sustaining the utilization;
(3) Linkage--little direct interaction between users and those responsible for the implementation;
(4) Reward--little previous reward history;
(5) Synergy--no continued, diverse, and persistent transmission of message.

It is important to note here that the identification of the problems is derived from an analysis of the Havelock factors. However, our interviews and observations in Chicago are consistent with the above interpretation.

An Observation

In Figure 4, we plotted use rates against cost and noted a substantial variation among the projects costing around $8 per teacher training hour. (This discussion ignores the low cost Portal Schools and the high cost Off-Campus Centers.) It is interesting to note the similarity between D&U ratings and use rates.

Medium	D&U Rating	Usage Rate
Collaborative Project	3.54	96%
Lansing Project	3.18	84%
Accessible Schools	2.87	84%
Summer Workshops	2.82	51%
Chicago Project	2.54	35%

The pattern is remarkably consistent, lending some credence to the validity of the Havelock model. This is especially noteworthy because usage rates were unknown to the panel of judges when making the ratings.

This relationship would lead one to consider carefully the shortcomings of the Chicago project mentioned in the discussion of the D&U factors. Activities designed to strengthen each of the weak factors may be an effective way to improve the situation.

Teacher Questionnaires

A major source of outcome data was obtained by mailing a four-page teacher questionnaire to all trained teachers in Chicago and Lansing. The questionnaires were mailed late in the school year (May and June) and the response rate of 61% is considered quite good under the circumstances. Because we know very little about possible non-response bias, the data must be viewed with caution. Time did not permit a non-response study. If anything, responses are likely to be biased in a positive direction; that is, non-responders are those not likely to be using USMES materials. Our interviews with eight principals and 24 teachers support this interpretation.

Summaries of questionnaire item results are reproduced on the following pages, first Lansing and then Chicago, Area A. All relevant data are reproduced for the consumers of this report, and an analysis of the questionnaires follows the data.

All figures are reported in percentages except for asterisked data which are means.

In terms of background characteristics, the Lansing and Chicago teachers are quite similar. They have been teaching about 11 years and have about 28 pupils per class. Most teach science (78-92%), are continuing at the same school, and report about 140 minutes of science per week. The major difference is the larger percentage (21%) of special teachers in Area A.

The major training opportunity has been described before, but is important to note that a number of teachers deviated somewhat from the expected training procedures. For example, in Lansing 45% of the teachers went to a full year course on USMES at Michigan State University rather than just the summer and the six fall classes. Also, a number of teachers first became exposed to USMES at one-day information meetings. These latter are hardly effective for the sustained effort required for effective curriculum utilization.

Question No. 12 was designed to assess teachers' knowledge and sympathy with the USMES approach. We suspected that possible difficulties with the implementation model might be with lack of knowledge of the program or with a negative attitude toward USMES. However, most teachers saw USMES as the curriculum developers intended it to be. The possible flaw in this conclusion is the rather large percentage (about one-third) who saw USMES as simulated--hardly what the authors have in mind. An additional concern lies with the high percent (34% and 43%) who describe the USMES course as difficult rather than easy. This may be related to the low adoption-persistence of USMES in these two districts.

Teachers' reactions to the workshops are found in Item 13. In both projects, major problems occurred with failure to address the problem of managing an USMES class. In Lansing, the training was judged too loosely run (38%) and some teachers were concerned about concentrating on one or two units (32%).

In Chicago, the training was rated unrealistic in preparing teachers to cope in the schools (60%). Again, there was concern over the technique of concentrating the training on one or two units. Other possible concerns were not expressed by most Chicago teachers on the questionnaire.

Item 14 was the source of the usage and persistence data reported earlier. It is noted here that Lansing teachers spent more days on USMES challenges (Chicago mean--34 days, Lansing mean--51 days). This, again, supports our judgment that the district-university model was more effective in transmitting the message of USMES adoption and subsequent use.

Sources of support for teachers incorporating a new program were assessed in Item 17. Except for a rather high rating for contact with the USMES central office, teachers did not perceive much local support. In fact, many (about 40%) felt quite isolated from other USMES teachers. This feeling was confirmed in our interviews, as well.

Although the general level of support in Lansing was low (only 32% received help from the resource team) all categories were rated higher than in Chicago. Item 19 is also aimed at the issue of support. The results are difficult to interpret. It appears teachers feel a need for a variety of supporting activities (synergy?) and, most important, Chicago teachers feel this need far more than those in Lansing.

Several reasons for the lack of persistence of utilization are revealed in Question No. 18. The majority do not intend to use the program next year, with "other priorities" and "leaving teaching" the major reasons. The low response to lack of preparation is somewhat puzzling given the responses to other items. Perhaps the best conclusion we can reach is that a variety of factors are working against the adoption of USMES, especially in Lansing and Chicago, Area A.

An encouraging result is 94% of the Chicago teachers willing to recommend USMES to another teacher. The figure seems high given other data we have. It may grow out of a belief in the program's value to others, even though the teacher feels considerable pressure not to continue it himself. These pressures include class management difficulties, other district priorities, and the sluggishness of the change process in a gigantic metropolitan school system.

The Lansing teachers are less likely to support the program after three years' experience; yet 62% would recommend it to a fellow teacher. This is three times the number of Lansing teachers who use it themselves. Again, it appears to be a case of "Yes, USMES has merit, but it is just not worth my while for the effort required for me to adopt and use the program given all the barriers." This attitude was expressed several times during our on-site visits, as well.

LANSING

USMES DELIVERY SYSTEM EVALUATION

TEACHER QUESTIONNAIRE

N = 45/66

1. Name _____

2. School _____

3. Years of teaching experience 11.4 * Grade level now teaching K-3: 36, 4-8: 59, Special: 5

4. Did you teach at the same school in 1973-74? Yes 88 No ____

6. Are you an USMES resource team member? Yes 15 No ____

7. Do you teach science? Yes 92 No ____ How many minutes per week? 135 *

Number of students per class (average) 27.8 *

What text(s) are you using? _____

---

8. Where did you receive your USMES training? (check all that apply)

5 Wexford School, Summer, 1972 (only)
80 MSU Course, Fall, 1972
45 MSU Course, Spring, 1973
-- One day workshop, 1973-74
12 Other (please specify)
-- Did not attend a workshop
17 Boston plus MSU course

(see Program Description for exact numbers)

9. Why did you attend an USMES training workshop? (check one)

36 Desire to learn of new programs generally
36 Desire to learn about USMES specifically
28 Strongly encouraged to by principal
-- Needed the money
-- Other (specify) _____

10. Did your principal attend a workshop on USMES? Yes 53 No ____

11. Do you now feel that the workshop prepared you adequately to teach USMES? Yes 58 No ____

12. Circle the one work in each word pair that, in your opinion, best describes the USMES course:

0		100		0		100
text		laboratory		lecture		problem solving
0		100		69		31
static		changing		real		simulated
97		2		43		57
science		history		difficult		easy
5		95		84		16
closed		open		effective		useless
11		89		82		18
dull		interesting		Design Lab		Learning Contract

*Means
Rest of results are percents

13. What was the main weakness(es) of your workshop training? (check as many as apply)

6 No weakness

32 Too much concentration on one or two units

3 Poor time of the year

38 Too loosely run

0 Too structured

50 Did not address the problems in managing an USMES class

15 Poor leaders

3 Too specific, ignored discussing the general philosophy

15 Too much concentration on the Design Lab

12 Unrealistic as preparation for the Lansing schools

26 Other (specify) _____

---

14. On the last page are code numbers for all USMES challenges. Please indicate which you used during 1972-73, 1973-74, and 1974-75, the number of students who participated in each, and the number of days they spent on the challenge. Please leave blank if you did not use any challenges during a year.

	1972-73			1973-74			1974-75		
	challenges #used	#students	#days	challenges #used	#students	#days	challenges #used	#students	#days
ONE	84	27*	51*	31	28*	59*	22	28*	51*
TWO	22	29*	44*	9	28*	45*	4	26*	28*
THREE	7	30*	51*	2	28*	40*	0	--	--

15. Did your building have a functioning Design Lab during:

1972-73 Yes 89 No ___ 1973-74 Yes 56 No ___ 1974-75 Yes 23 No ___

16. How many other teachers in your building used USMES during:

1972-73 5.5* 1973-74 2.0* 1974-75 1.0*

*Means
Other numbers are percents

17. Please check yes or no to the following.

Since your workshop training, have you:	Yes	No
Received significant help from a resource team member?	32	
Met regularly with other USMES teachers to discuss the program?	23	
Received any additional training from the district or MSU?	21	
Received communications, mailings, etc., from the USMES central office in Boston?	66	
Been strongly encouraged by your principal to use USMES?	24	
Been strongly encouraged by someone in the district or MSU staff to use USMES?	21	
Felt isolated from other USMES teachers?	34	

---

18. Do you plan on using at least one USMES challenge next year?

Yes 36 If yes, skip to Item 18.

No 64 If no, what is the reason? (check one below)

7 I do not like USMES.

14 I've tried USMES and it didn't work.

7 I don't feel adequately prepared to teach the program.

11 I'd like to use USMES, but other things have higher priority.

7 USMES does not help my students learn the basic math and and reading skills.

21 I will not be teaching.

14 Teaching USMES demands too much of the teacher.

18 Other (specify) _____

19. Please check yes or no to each of the following.

Would you use USMES more if:	Yes	No
You had received better initial training?	29	___
Better resource books and background papers were available?	44	___
Continuing in-service training/meetings were available?	55	___
Your building had a better Design Lab?	56	___
More teachers in your building were using USMES?	47	___
You felt your principal supported USMES more?	27	___
You felt MSU supported USMES more?	19	___
Resource team help was more available?	47	___
USMES related more to the required curriculum?	38	___
Your principal told you to use it?	29	___
Use of USMES was mandated by the school board?	48	___
The program was extensively revised and improved?	28	___
You could see examples of successful use in Lansing?	45	___

20. Would you recommend USMES to another teacher? 62 ___

Use of Challenges in Lansing:

	Year I	Year II	Year III
Advertising	N	N	0
Bicycle Transportation	N	N	0
Burglar Alarm Design	8	1	0
Classroom Design	N	2	1
Classroom Management	N	1	2
Consumer Research - Product Testing	7	2	2
Describing People	10	1	1
Design Lab Design	N	N	1
Designing for Human Proportions	4	0	0
Dice Design	8	0	0
Electromagnet Device Design	1	0	1
Finding Your Way/ Getting There	N	N	1
Games for Indoor Recess	N	N	N
Growing Plants	1	2	1
Lunch Lines	3	0	0
Manufacturing	N	N	0
Mass Media	N	N	N
Nature Trails	N	1	0
Orientation	N	N	N
Pedestrian Crossings	3	1	0
Play Area Design and Use	N	0	0
Recycling	N	1	0
School Rules and Decision Making	N	N	2
School Supplies/ School Store	N	N	1
School Zoo	N	1	0
Soft Drink Design	4	1	0
Traffic Flow	N	1	0
Ways to Learn	N	1	0
Weather Prediction	N	0	0
Other (or Unidentified)	2	3	0

N = Not Generally Available

CHICAGO (AREA A)

USMES DELIVERY SYSTEM EVALUATION

TEACHER QUESTIONNAIRE

N = 95/164

1. Name _____

2. School _____

3. Years of teaching experience 10.8* Grade level now teaching K-3: 21, 4-8: 58, Special: 21

4. Did you teach at the same school in 1973-74? Yes 94 No ____

5. What is your childhood hometown? Chicago or Suburbs -- Other --

6. Are you an USMES resource team member? Yes 11 No ____

7. Do you teach science? Yes 78 No ____ How many minutes per week? 149*

   Number of students per class (average) 27.6*

   What text(s) are you using? _____

---

8. Where did you receive your USMES training? (check one)

   4 East Lansing, Mich. State Univ., Summer 1973 (two weeks)
   47 Chicago, Dyett School, Summer 1973 (two weeks)
   27 Chicago, Ray School, Fall 1973 (three Saturdays)
   6 Chicago, Hope School, Summer 1974 (two weeks)
   15 Chicago, Ray School, Winter 1975 (four days)
   -- Did not attend a workshop

9. Why did you attend the training workshop? (check one)

   57 Desire to learn of new programs generally
   34 Desire to learn about USMES specifically
   8 Strongly encouraged to by principal
   -- Needed the money
   2 Other (specify) _____

10. Did your principal attend a workshop on USMES? Yes 39 No ____

11. Do you now feel that the workshop prepared you adequately to teach USMES? Yes 66 No ____

12. Circle the one word in each word pair that, in your opinion, best describes the USMES course:

text (2)	laboratory (98)	lecture (4)	problem solving (96)
static (2)	changing (98)	real (66)	simulated (34)
science (94)	history (6)	difficult (34)	easy (66)
closed (0)	open (100)	effective (96)	useless (4)
dull (2)	interesting (98)	Design Lab (84)	Learning Contract (16)

*Means
Rest of results are percents

13. What was the main weakness(es)of your workshop training? (check as many as apply)

20 No weakness

34 Too much concentration on one or two units

9 Poor time of the year

4 Too loosely run

2 Too structured

42 Did not address the problems in managing an USMES class

0 Poor leaders

4 Too specific, ignored discussing the general philosophy

8 Too much concentration on the Design Lab

60 Unrealistic as preparation for the Chicago schools

32 Other (specify) _____

---

14. On the last page are code numbers for all USMES challenges. Please indicate which you used during 1973-74 and 1974-75, the number of students who participated in each, and the number of days they spent on the challenge. Please leave blank if you did not use any challenges during a year.

1973-74				1974-75			
challenges # used		# students	# days	challenges # used		# students	# days
ONE	35	33*	29*	ONE	22	23*	33*
TWO	13	38*	43*	TWO	13	25*	40*
THREE	5	19*	28*	THREE	4	26*	46*

15. Did your building have a functioning Design Lab during:

1973-74 Yes 43 No ____ 1974-75 Yes 30 No ____

16. How many other teachers in your building used USMES during:

1973-74 2.7* 1974-75 2.3*

*Means
Other numbers are percents

17. Please check yes or no to the following.

Since your workshop training, have you:	Yes	No
Received significant help from a resource team member?	27	___
Met regularly with other USMES teachers to discuss the program?	10	___
Received any additional training from the district or area?	12	___
Received communications, mailings, etc., from the USMES central office in Boston?	76	___
Been strongly encouraged by your principal to use USMES?	20	___
Been strongly encouraged by someone on the district or area staff to use USMES?	18	___
Felt isolated from other USMES teachers?	48	___

---

18. Do you plan on using at least one USMES challenge next year?

Yes 54 If yes, skip to Item 19.

No 46 If no, what is the reason? (check one below)

0 I do not like USMES.

0 I've tried USMES and it didn't work.

15 I don't feel adequately prepared to teach the program.

28 I'd like to use USMES, but other things have higher priority.

3 USMES does not help my students learn the basic math and reading skills.

25 I will not be teaching.

15 Teaching USMES demands too much of the teacher.

15 Other (specify) _____

19. Please check yes or no to each of the following.

Would you use USMES more if:	Yes	No
You had received better initial training?	___	___
Better resource books and background papers were available?	___	___
Continuing in-service training/meetings were available?	___	___
Your building had a better Design Lab?	___	___
More teachers in your building were using USMES?	___	___
You felt your principal supported USMES more?	___	___
You felt the Area supported USMES more?	___	___
Resource team help was more available?	___	___
USMES related more to the required curriculum?	___	___
Your principal told you to use it?	___	___
Use of USMES was mandated by the school board?	___	___
The program was extensively revised and improved?	___	___
You could see examples of successful use in Chicago?	___	___
20. Would you recommend USMES to another teacher?	___	___

Advertising
Bicycle Transportation
Burglar Alarm Design
Classroom Design
Classroom Management
Consumer Research - Product Testing
Describing People
Design Lab Design
Designing for Human Proportions
Dice Design
Electromagnet Device Design
Finding Your Way/ Getting There
Games for Indoor Recess
Growing Plants
Lunch Lines
Manufacturing
Mass Media
Nature Trails
Orientation
Pedestrian Crossings
Play Area Design and Use
Recycling
School Rules and Decision Making
School Supplies/ School Store
School Zoo
Soft Drink Design
Traffic Flow
Ways to Learn
Weather Prediction
Other (or Unidentified)

V. CONCLUSIONS

Our major conclusion in this evaluation is that the Lansing and Chicago experiments were generally ineffective in achieving the desired dissemination and utilization of the USMES curriculum. We further believe that the reasons for the shortcomings are not necessarily inherent in the models themselves but, rather, arose from the way in which they were actually implemented.

Let us review the facts that lead us to the above conclusions. We will do this separately for the two projects because the problems and the causes are quite different in the two cases.

Lansing

Initially, the Lansing experiment appeared to be quite successful. Eighty-four percent of the teachers tried USMES in 1972-73 and reaction to the workshop was positive. Unfortunately, the initial enthusiasm has waned considerably. Only 31% of the initial group used USMES the second year and the number has dropped to 22% in 1974-75. Furthermore, few teachers indicate their intention to use the materials in 1975-76.

The cost of the project was moderate, but the expected diffusion of the course throughout the district has not occurred. As a result, the cost per student exposed for the past three years has been rather high compared to other projects.

The cooperative district-university model was rated about average on the D&U factors, although all of the NSF supported strategies have some noticeable shortcomings. Lansing is no exception. The models concentrate on the content of the course rather than on the change process. They are not very flexible to adjust to user problems and, most serious of all, do not provide for continued and varied transmission of the information.

In considering potential reasons for the failure of USMES to persist, we must examine the discrepancies between what was to happen and what did occur. Also, our interviews suggest several problems with the Lansing project. These include:

1. Because of the desegregation plans, several schools were forced into using USMES at the last minute without teacher consultation.

2. The 10% time allocated to a principal for continued support and coordination of USMES was either not expended or was insufficient for the task.

3. The district failed to live up to its commitment in subsequent years to incorporate USMES into the science, math, and social studies curriculum in the district.

4. No specific follow-up commitments or plans were made (except No. 3 above as noted) for 1973-74 or 1974-75. There was hope but no agreements.

5. The chief coordinator for the university was on sabbatical during 1973-74 so the expected leadership he might provide was lacking.

6. There is no strong advocate of the new program in a power position.

7. There is confusion locally as to whether this was an USMES, district, or MSU project. As such, no clear leadership has evolved.

8. This district, as in most larger cities, is experiencing a tremendous push for reading and math. Science courses, real or perceived, have very low priority in the schools.

9. Finally, it is our impression that USMES is a very easy course to drop. There are no textbooks or student manuals, and if the Design Lab disappears (which happens) teachers have little problem in ignoring the course.

In spite of the above, there is a small cluster of committed USMES teachers and administrators in Lansing. They use USMES and advocate it to their colleagues. It is our opinion that a well constructed renewal plan could turn the attrition around if it were implemented in the near future. Unless this occurs, it is our opinion that USMES in the Lansing target area is likely to die out.

Chicago, Area A

The situation in Chicago is quite different in that the project has never really gotten a good start. Only 35% of the trained teachers tried the approach the first year, and this number dropped to 22% in 1974-75, identical to the figure for Lansing in 1974-75.

Again, the initial cost for the project was rated moderate, although total cost (district plus NSF) is quite high.

The district-only model (as implemented) was rated quite low by the judges and suffered a number of marked limitations. The power structure in the district was not able or did not influence the teachers. There was little built-in flexibility to adjust to user needs, and virtually no sustained district effort in the following year to stimulate the utilization of the course. We believe the district has not had a history of affecting real change, and the linkages between the sender (responsible group) and users is virtually non-existent. Coupled with these D&U limitations is the problem of changing anything in the complex bureaucracy of the Chicago school system.

Specific limitations or discrepancies between planned and actual activities include the following:

1. The hoped for coordination between USMES, the assistant superintendent for curriculum, the principals, and the resource team did not occur.

2. Space that was to be designated in the target buildings for Design Labs was not allocated or was severely inadequate.

3. The district commitment to purchase Design Labs was fouled up and equipment arrived late or, in some instances, not at all.

4. Building principals failed to hire Design Lab managers with their limited discretionary funds or, if they were hired, were saddled with several different responsibilities (e.g., security guards).

5. The resource team was not given (or did not take) the released time it was promised to assist other teachers in USMES problems.

6. USMES teacher meetings as promised by the district were not convened.

7. A program called Continuous Pupil Progress has been mandated by the school board in reading and math. Because scores are published yearly in the paper by building principals, they are demanding that teachers spend the majority of their time in these subjects. In some cases, teachers are told <u>not</u> to teach science.

8. Because of building autonomy, principal support is essential in curriculum decisions. Most appear apathetic to the USMES philosophy.

9. Many teachers find it difficult to manage a class of 35 pupils in the open format required for real problem solving.

10. The highly structured and rigid environment in the schools make any innovative change extremely difficult. Rewards are granted far more readily for maintenance than for change.

11. Teachers are often reassigned to new jobs or new buildings without being consulted.

12. Many other programs associated with schools in disadvantaged areas in Chicago have much higher district and teacher priority. A new and "different" program such as USMES will always struggle for survival.

The list of shortcomings is lengthy and explains quite well the reasons for the limited success of the implementation. Most of the problems are related to unanticipated external pressures (e.g., desegregation, reading accountability) or failure of involved parties to fulfill their responsibilities. Strong district commitment and support would solve many of these latter problems in subsequent implementation projects. However, we believe there are one or two weaknesses in the proposed models that need to be addressed. First implementation is more than a one-year process and projects should be funded accordingly. A three-year plan of dissemination, utilization, piloting, and follow-up should probably be considered for increasing NSF funding effectiveness.

Second, for district-centered projects, someone in an influential position must be clearly associated with the project and be in a position to be rewarded if the implementation is successful. The lack of clear and sustained local leadership was a major problem in both cities.

Thirdly, because of the important role of principals in the change process in elementary schools, we would recommend their active involvement as a major component of an implementation strategy.

Finally, we would question two of the "critical elements" ascribed to the models initially (see page 13); namely, the number of USMES trained teachers in a building seems little related to the success of implementation, and intensive training in a particular unit caused major concern among most teachers. We agree strongly with the two critical elements of strong administrative support and need for Design Labs.

Although the major conclusions are disappointing to the audiences of this report, we should note several of the positive aspects of this implementation experiment. More than 200 teachers have been trained and nearly 10,000 students have experienced at least one USMES challenge. A dedicated group of teachers continues to use the approach and does provide a small potential base for continued growth. This is especially true in Chicago, given the renewed interest in USMES in Area B.

Most importantly, students and teachers alike appear to like the program. Without exception, USMES students we interviewed were enthusiastic in their support of the course. Although implementation success to date has been less than desired, the interest of students and the committee core of USMES teachers hold some hope for the future of the program.

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APPENDICES

Appendix A - Cost Analysis, Lansing 1972-73
Appendix B - Cost Analysis, Lansing 1973-74
Appendix C - Cost Analysis, Chicago 1973-74
Appendix D - Teacher Interview Summaries

APPENDIX A

Cost Analysis

Lansing 1972-73

Grant (W007626)	$ 55,245.00
Budget (from EDC)	$ 55,241.00
	$ 4.00

Implementation Costs	Budget
To Lansing District:	
D.L., space and staff	$ 24,000.00
Coordination, 1/10 principal	1,800.00
Workshop (50T x 4 days x $25)	5,000.00
Workshop space	12,000.00
MSU courses	
Fall off-campus diff. (50 x $21)	1,050.00
W + S off-campus diff.(60 x $21)	1,260.00
	$ 34,310.00
To Michigan State University:	
Summer workshop staff (2 x 5 days x $100)	$ 1,000.00
	$ 1,000.00
To USMES (NSF):	
D.L., tools and supplies	$ 6,000.00
Coordination	
Local director	7,105.00
Liaison staff	3,500.00
Summer workshop	
Consultant fees + travel + subs.	6,040.00
Inservice training (MSU)	
Fall basic tuition (50 x $45)	2,250.00
W + S basic tuition(50 x $45)	2,250.00
Printed materials	660.00
Indirect costs	
To Lansing schools (8% local director and principal costs)	848.00
	$ 28,653.00

Summary: Implementation Costs

Lansing District	$ 34,310.00
Michigan State University	$ 1,000.00
USMES (NSF)	$ 28,653.00
	$ 63,963.00

APPENDIX A

(continued)

Documentation and Evaluation Costs

To Lansing District:	$	0.00
To Michigan State University:	$	0.00
To USMES (NSF):	$	
Evaluation and monitoring		
Test administration		1,500.00
Observation		5,530.00
Report writing		5,045.00
Control schools		2,500.00
Analysis (Shapiro + staff)		2,050.00
Progress report preparation		2,250.00
Fringe benefits on above		2,186.00
Indirect costs		
To Lansing schools (8% of observer cost)		280.00
To EDC (36% of D & E costs exclusive of Shapiro and liaison)		5,247.00
	$	26,588.00

Summary: Documentation and Evaluation Costs

Lansing District	$	0.00
Michigan State University	$	0.00
USMES (NSF)	$	26,588.00
	$	26,588.00

APPENDIX B

Cost Analysis

Lansing 1973-74
(Supplemental Grant)

Grant (W007626 001)	$ 12,970.00	
Budget (from EDC)	$ 12,897.00	
	$ 73.00	no correction applied

Implementation Costs

To Lansing District:	$ 0.00
To Michigan State University:	$ 0.00
To USMES (NSF):	$ 0.00

Summary: Implementation Costs

Lansing District	$ 0.00
Michigan State University	$ 0.00
USMES (NSF)	$ 0.00
	$ 0.00

Documentation and Evaluation Costs

To Lansing District:	$ 0.00	
To Michigan State University:	$ 0.00	
To USMES(NSF):	$	
Follow-up Evaluation		
Observations		1,500.00
Problem solving test admin.		750.00
Structured interviews w/teachers		900.00
Misc. data collection		360.00
Design and analysis		425.00
Travel		500.00
Misc. expenses		200.00
Materials and supplies		200.00
Fringe benefits on above		542.00

APPENDIX B

(continued)

Prep. of Implementation Manual	
Editorial supervision	1,650.00
Editorial assistance	2,250.00
Prep. and reproduction costs	500.00
Fringe benefits on above	624.00
Indirect costs	2,496.00
	$ 12,897.00

Summary: Documentation and Evaluation Costs

Lansing District	$ 0.00
Michigan State University	$ 0.00
USMES(NSF)	$ 12,897.00
	$ 12,897.00

APPENDIX C

Cost Analysis

Chicago 1973-74

Grant (W007626 002)	$ 79,657.00	
Budget (EDC)	$ 79,523.00	
	$ 134.00	no correction applied

Implementation Costs

To Chicago District:	$
RPW team training - stipends (1/2)	600.00
Summer workshop	
Teacher stipends (100 x $75/wk x 2 wks)	15,000.00
Secretarial expenses	600.00
Video equipment and staff	1,000.00
Classroom materials	
Library sets (15)	450.00
Resource books (150)	150.00
"How To" cards	675.00
Design Labs	
Space (12 rms x 1/2 use)	12,000.00
Staff (12 x $3500)	42,000.00
Equipment (6)	6,000.00
Coordination and liaison	
Administrator(s) (20 days x $100)	2,000.00
RPW staff (40 days x $50)	2,000.00
	$ 82,475.00
To USMES (NSF):	
RPW team training (travel + subs. + stipends (1/2))	2,400.00
Summer workshop	
USMES staff (3) (salary + travel + subs.)	4,980.00
Teaching staff (consultants) (salary + travel + subs.)	24,150.00
RPW team	3,300.00
Teacher stipends	7,500.00
General expenses	1,200.00
Design Lab equipment (6)	6,000.00
Coordination and liaison	
USMES staff - salary and travel	6,100.00
Fringe benefits on above	1,216.00
Indirect costs on above	2,584.00
	$ 59,430.00

APPENDIX C

(continued)

Summary: Implementation Costs

Chicago District (Area A)	$ 82,475.00
Chicago District (Area B)	$ 13,626.80
USMES (NSF)	$ 59,430.00
	$155,531.80

Documentation and Evaluation Costs

To Chicago District:	$ 0.00
To USMES (NSF):	$
Classroom observation	2,820.00
Test administration	900.00
Other observation	500.00
Observer travel	638.00
Teacher reports	7,711.00
Observer training	415.00
Report and manual proposals	3,358.00
Fringe benefits on above	1,200.00
Indirect costs on above	2,551.00
	$ 20,093.00

Summary: Documentation and Evaluation Costs

Chicago District	$ 0.00
USMES (NSF)	$ 20,093.00
	$ 20,093.00

APPENDIX D

Teacher Interview Summaries

(These summaries present a brief portrayal
of the USMES experience in selected schools.)

USMES Teacher Interview

Wednesday, May 21, 1975 - School A, Chicago
Interviewed: 7 teachers in one group

Except for the section "General Impressions" the following are as reported by the teachers and have not necessarily been verified.

School Setting

The school enrolls grades K-8 in a large old building and a somewhat (1948?) newer extension. Building care is minimal.

Teachers estimate a certified faculty of 65 and a black student proportion of almost 100%. Many students are from single parent families receiving public assistance.

Instruction takes place mainly in self-contained classrooms of 33-38 students, with some interchange and teaming at levels 7 & 8. Teachers are encouraged by the principal to attend to "first things first" --basic skills--but then permitted to diverge if these are satisfactory.

History of Training

An USMES staff member visited the building during the spring of 1973. As a result of his presentation, one teacher, Teacher M, attended the MSU resource team workshop and about 10 the teacher workshop during summer '73. Additional teachers, mostly at the encouragement of Teacher M, attended subsequent workshops to bring the total trained teachers to over 20. At least two became development teachers and received some training in Boston.

History of Support

Design Lab materials did not begin to arrive until the middle of the first winter. A room was provided, but no Design Lab manager or person to take part of the regular teacher's class. Thus, any use was by the full class with the regular teacher in charge. Later, several people were made managers; however, all proved unsatisfactory, often because other duties (security guard) had higher priority.

The resource team member has been given only two days released time during the past two years to function.

The principal has been "very supportive."

The area curriculum staff has not been heard from. The area/district/system seems uninterested in USMES.

Level of Usage

All 7 teachers had used USMES during the past year. Five intended to next year, two were not sure. Of the approximate 10 other trained teachers still at the school, none were known to be using or intending to use.

It was reported that among these 10 there was an attitude of disenchantment and/or frustration raised during the wait for the Design Lab, and a current feeling of the program being too much work for the potential rewards.

Conflicts With Style or Philosophy

There were no philosophical conflicts with USMES among the 7 teachers interviewed.

Two, including the resource team member, reported a style conflict which they still encounter on occasion.

General Impressions

The resource team member, Teacher M, is a leader in the faculty and often served as spokesman for all. She is enthusiastic, willing to help, but still has some problems with USMES herself. (She was out ill for about four months this year.)

(cont.)
School A

The other teachers in the group are willing to follow Teacher M. Several appear open-activity-centered types who might be using real problem solving type activities with or without USMES.

All agreed the program was of value but none could offer an adequate verbalization of why.

It would appear this is a biased sample of the building's trained teachers--those who chose to use. The 10 or so "non-users" seemed to be "unavailable" at the interview time.

USMES Teacher Interview

Thursday, May 22, 1975 - School B, Chicago
Interviewed: 4 teachers individually, 3 in one group

Except for the section "General Impressions" the following are as reported by the teachers and have not necessarily been verified.

School Setting

School B is one of the largest elementary operations in the city. Over 2,000 students (K-8) and close to 100 staff are housed in three buildings, one new, one old and being remodeled, and one middle-aged and in general disrepair.

The student population is virtually all black while the teacher ratio is around two black to one white.

The building principal perceives strong pressure from above for improvement in mathematics and reading scores, which he communicates to his staff.

History of Training

Five teachers were trained at the summer '73 workshop. In at least one case, the teacher's attendance was suggested by the principal, although the teacher was agreeable and willing.

Several additional teachers ("more than in summer," "maybe a dozen") were trained at the Saturday workshops during the fall of '73.

History of Support

Original plans called for a Design Lab to be provided by the board and a full-sized room allocated. The materials were (are) slow in arriving and the room was taken for other purposes. When the materials did come, a washroom with fixtures removed became the Design Lab.

The principal never assigned a Design Lab Manager, although he had floating staff positions which he could have used. A volunteer from the the community was recruited and served adequately during 73-74.

During 74-75, the principal has strongly insisted on an increased concentration on basic skills and a rapid implementation of the continuous progress programs. He has, thus, effectively withdrawn most of his active support from any science teaching.

One of the summer '73 trained teachers was "master teacher" during 73-74. As such, he was freed of a normal class and was able to circulate somewhat at will to assist others. During 74-75, the "master teacher" position was abolished and he was returned to a normal classroom.

No one has had extensive on-going contact with other USMES teachers in the system, with the resource team, or with the USMES central staff.

Level of Usage

During 73-74, use of USMES was moderate with about half of the trained teachers attempting to use the program. Enthusiasm waned during the wait for Design Lab materials. This was offset somewhat by the opportunity the volunteer manager provided for sending several groups of students to the Lab when materials finally did arrive.

There was very little, if any, use of USMES during 74-75. This is due largely to the emphasis on the specific teaching of basic skills and the coordinate discouragement of science teaching. The Design Lab is not as available as the previous year; however, some students do find it possible to work on projects other than USMES with its facilities.

(cont.)
School B

Conflicts With Style or Philosophy

None of the teachers interviewed saw a major conflict with teaching style in their personal situation, although they felt this might be a problem to others.

All expressed agreement with the USMES philosophy. In addition to problem-solving and higher order cognitive processes, the strong feeling was expressed that USMES is of major value in developing the basic skills and, thus, was not at odds with their principal's objectives.

General Impressions

The principal and faculty at this school were out of phase to a greater degree than at other schools visited. All teachers interviewed worked in an annex building. Their separation seemed psychological as well as physical, and the principal is regarded more as an inhibitor and/or an annoyance than as a leader.

In this school, USMES faced moderate obstacles during 73-74, major obstacles during 74-75, and has mostly died. It is doubtful it will revive.

USMES Teacher Interview

Thursday, May 22, 1975 - School C, Chicago
Interviewed: one teacher and several students

Except for the section "General Impressions" the following are as reported by the teacher and have not necessarily been verified.

School Setting

School C serves approximately 700 students with grades K-8. There are 23 regular classroom teachers and an additional 16 specials. The operation is housed in a pre-1900 building with a small modern addition, and seems to have ample space for a diversity of programs.

The area served by the school is directly north of the University of Chicago. Students are roughly: 50% black, 40% white, 10% oriental and other. The area is certainly not typical of the city in general and may represent overall one of its most highly literate sections.

The building principal is a dynamic personality active in the community as well as the school. He insists on attention to basic skills during morning hours, but claims to encourage a diversity of learning strategies. Use of the afternoon appears to be largely at the teacher's discretion. The principal has been involved in USMES in Chicago from its start and is fully supportive of the program.

SCIS is used in some lower grade classes.

History of Training

The principal is a member of the Area resource team and was trained at MSU during the summer of '73. Eight teachers attended the summer '73 teacher workshop. Two additional teachers were trained during the fall of '73. One teacher subsequently became a development teacher.

History of Support

The principal and one or two teachers have maintained close ties with the USMES central staff. The school has been unofficially designated a showcase for USMES,and the Area's teacher workshops in the fall of '73 and the winter of '75 were conducted using its facilities.

The principal has provided a full-sized room to house the USMES-supplied Design Lab (in addition to other similar activities). A staff member was appointed Design Lab Manager and, while also having other duties, he is effectively available as much as needed.

The principal has been the prime source of information and encouragement to the staff. Teacher contact with Area office personnel has been virtually non-existent.

Levels of Use

Four teachers implemented USMES immediately during the fall of '73. During that year several additional teachers tried parts of the program, bringing total use during 73-74 to 6-7 teachers. During 74-75, the level of use has dropped to approximately four.

Conflicts with Style or Philosophy

The teacher interviewed reported a slight style conflict, but also felt that her style was somewhat a function of her current class of students, and anticipated the possibility of no conflict with a different class next year. Philosophy conflict was not a problem with her, the principal, or seemingly with the general tone of the building.

(cont.)
School C

General Impressions

The feelings one has in School C are distinctly different from those of the other schools visited in Chicago. There appears to be a much higher level of respect and a resulting comfort in the relationships between principal, staff, and students. Physically, a positive learning environment has been established.

While alive, the USMES program is waning at School C. Use levels of trained teachers are falling off, while there shows no signs of expansion or extension. The principal speaks as though he is unaware of this situation. Whether he is blinded by his own involvement and enthusiasm or is simply reluctant to be fully open is not clear.

In what is the most positive and receptive environment seen to date, USMES is barely hanging on.

USMES Teacher Interview

Wednesday, June 4, 1975 - School D, Lansing
Interviewed: 2 teachers, separately

Except for the section "General Impressions" the following are as reported by the teachers, and have not necessarily been verified.

School Setting

School D is located in a middle-to-low income suburban section of Lansing. The building houses two classes (30 st/class) each of grades K-6. The lower levels are strictly self-contained while some interchange of students occurs at levels 5 & 6.

The district is moving toward a program of emphasis on highly specified math and reading objectives with a corresponding de-emphasis of social studies and science. The building receives little special funding and, as a result, no aides or other specials to augment the core staff.

The building appears to have been constructed in the early 1960's and to be in generally good repair.

History of Training

Teacher N was at School E in 71-72 and 72-73. She participated in the Wexford workshop and the fall and winter MSU courses. Teacher O was brought into the program during the summer of 73. She reports being trained at a two-week MSU workshop (the resource team workshop?). Both believe there are no other trained teachers in the building.

History of Support

Teacher N was at School E during 72-73. During that time she enjoyed a staffed Design Lab and the support of the principal. In 73-74 she (and the principal) moved to School D. He has remained supportive; however, Design Lab facilities are not available.

Both teachers have perceived apathy on the part of the district. Teacher N reports being a resource team member, but has been given no released time to conduct activities.

Levels of Usage

Teacher N is continuing to use USMES activities with her entire class. Teacher O attempted use during 73-74. She has not persisted, explaining that she sees grade 1 students as too young.

Sytle and Philosophy Considerations

Teacher N is enthusiastic toward the philosophy and believes students will advance in both problem-solving and basic skills by using USMES activities. She reports a personal style conflict arising occasionally. She feels the workshops failed in addressing this.

Teacher O does not perceive an "USMES philosophy" and feels the few basic ideas are not unique, and that the program is somewhat comical in its over-formalization and over-institutionalization.

General Impressions

This school was not in the original target group. Its connection with USMES is the result of the transfer of a principal and a teacher. Teacher N's husband is a cluster principal in Lansing and a prime mover in arranging the project in 71-72. Her persistence may be a result, thus, of her unique involvement, her personal style, a successful dissemination effort, or any combination.

Teacher O was never in the mainstream of the dissemination program.

(cont.)
School D

USMES is in use at School D through an unusual set of circumstances; however, the instance does demonstrate that the program can at times be viable without the oft-cited "necessary conditions" of a Design Lab and a critical mass of users.

USMES Teacher Interview

Wednesday, June 4, 1975 - School E, Lansing
Interviewed: 2 teachers, separately; 1 Design Lab manager

Except for the section "General Impressions" the following are as reported by the teachers, and have not necessarily been verified.

School Setting

School E is located in a poorer suburban section of the city. The building has three classes each of K-6 with a core staff incremented by two aides. There appears to be little departure from the self-contained mode at any level.

The building experienced a change of principals over the summer of '73. Teachers feel a major emphasis on math and reading within the district is coming but is not yet a major influence.

History of Training

Approximately eight teachers, including Teacher P, volunteered to participate and attended the summer '72 workshop. All continued through the fall MSU course with several also enrolling in the winter and spring courses. Two or three additional teachers were picked up along the way, including Teacher Q in the spring.

Several teachers, including both interviewees, became development teachers over the summer of '73.

The Design Lab manager attended training (for D.L.Managers?) at another Lansing school during the fall of '72.

History of Support

A Design Lab area on the stage of a gymnasium-auditorium has been provided during each year. The Design Lab manager has been available and, in addition, during 72-73 a second manager made use during almost any hour possible. The facility is limited to six students, is not well lit or ventilated, is subject to noise when a gym class is in progress, and has been declared unsuitable for use of power tools by the city fire marshal.

The principal of 72-73 was characterized as supportive of USMES; the principal of 73-74 and 74-75 as tolerant.

Teacher Q has had no contact with a resource team member; Teacher P only with a teacher at another building.

During the early part of the dissemination effort, teacher contacts with observers and evaluators were frequent, in addition to teacher report writing. The staff found these activities somewhere between annoying and disruptive.

Levels of Usage

During 72-73 eight teachers used USMES, including the Design Lab. The following year that number was halved and Design Lab use cut to one-third.

This year it appears only Teacher P used the program. She did not use the Design Lab facilities. To the knowledge of the interviewees, she is also the only teacher intending to use USMES in 75-76.

Style and Philosophy Considerations

Teacher P reports that the USMES style and philosophy are closely aligned with her own and that she would be conducting classes in this mode with or without the program.

Teacher Q has doubts about both, but enjoyed the trip to Boston for training to be a development teacher.

(cont.)
School E

Neither held particular insights into the other USMES-trained teachers, except that an USMES program was time-consuming, if not difficult, to run, and there was no evidence to them that USMES enjoyed any sort of elevated priority among building or district administration.

General Impressions

School E is currently an aesthetically depressing amalgam of green-washed buildings. A new facility is being constructed on adjacent property, which may explain in part the present inattention to physical upkeep, but the lethargic, uninspired tone seems to pervade the students and staff, as well.

Individual teachers, working independently, may strike out on their own and achieve notable successes. School E as a whole, however, seems at present to be unfertile ground for the implanting of any demanding innovation.

USMES Teacher Interview

Thursday, June 5, 1975 - School F, Lansing
Interviewed: 2 teachers, separately; 1 aide

Except for the section "General Impressions" the following are as reported by the teachers, and have not necessarily been verified.

School Setting

School F is one of four buildings in a Lansing "elementary cluster" formed for integration. This arrangement was formed during the summer of '72.

The building is an old (1925?) high school. Presently contained are 12 teachers and several aides. Not all grade levels are represented due to the clustering. Minority enrollment is 17 percent.

With the clustering came several constraints for teachers in the buildings. First was a major emphasis on individualization of instruction for students. Teachers were discouraged from using any large group instruction procedures but, rather, urged to devise specific instructional sequences for each student, all leading, however, to the same terminal objectives in mathematics and reading. (Objectives are more fluid and discretionary in other areas.) At the same time, it was decided that all buildings and teachers within the cluster would use the same materials and programs from which to draw their specific procedures--if one had USMES, they all would. This idea seems now to have been relaxed.

The principal has been at the building at least three years and seems well liked by the staff. Teacher R feels that the principal personally would like a fuller, more humanistic, program than he is able to administrate.

History of Training

School F was not in the original dissemination plan but was included due to the clustering. All teachers from cluster schools attended a two-week workshop in August '72, four days of the second week being the USMES segment. This was mandated. Several continued into the fall MSU course, although at least one teacher declined to attend and experienced no opposition from the district. No teachers are believed to have continued past the fall course, nor are any of the teachers new to the building known to have received training.

History of Support

A Design Lab and manager were provided during 72-73. The manager was reassigned during 73-74 and many of the tools promptly disappeared. What remains is still housed in the original room for use by any desiring teacher.

The principal has always been sympathetic to the program but has seemed to the staff to, at times, have had higher priority items pulling at him.

The district officially has seemed uninterested, although the staff has had some contact with the district-MSU liaison person and several teachers from another Lansing school. Regular mailings have been received from Boston. No teachers have become development teachers.

Levels of Usage

Four teachers used USMES during 72-73. The following year this number halved, and this year there is no evidence of any use.

Teacher R reports, however, that he is currently using the philosophy, and that several others are doing likewise.

(cont.)
School F

Style and Philosophy Concerns

No one felt the USMES style would be a major problem for anyone on the building staff, although they acknowledged it might be for some teachers. The question was raised as to whether the change from individual, objective-oriented learning to USMES activities was an easy one for all students.

As noted above, several teachers are reported to be using the USMES philosophy, if not its materials.

General Impressions

Most teachers at School F had no desire to be involved with USMES in the first place. The program seems to have been imposed upon them in a fairly unskilled manner, and most reacted negatively. Some became openly defiant. Other, more sophisticated, teachers appear to have rolled with the punch, did what was required of them, gave the program lip service, and then effectively ignored it.

The claim that some are using the USMES philosophy can be believed only if one is interpreting the philosophy in an extremely general manner. Beyond this, there is no evidence that the staff is familiar enough with USMES to know if it is using its philosophy or not.

At School F in 72-73 much came at once with clustering, individualized programs, new administrative structure, etc. It appears USMES was lost in the shuffle.

USMES Teacher Interview

Thursday, June 5, 1975 - School G, Lansing
Interviewed: 3 teachers, separately and as a group

Except for the section "General Impressions" the following are as reported by the teachers, and have not necessarily been verified.

School Setting

School G is housed in a well-maintained post-war building, with approximately 22 regular teachers on the staff. Extensive teaming is the general rule with only six self-contained classes. The building is physically laid out for this extensive teaming, with many large areas accommodating 90 students and three staff. Which grade level(s) and which teachers operate in the self-contained mode each year has been at the discretion of the principal.

The building has had a different principal each of the last three years, 73-74 being an intentional temporary appointment of a central office staff person.

Student population is from mostly low SES families, with minorities constituting 35 percent. There has been some racial tension in the fifth and sixth grades during the last year.

District objectives K-6 in mathematics and reading are being given a high priority by the current principal and are, thus, becoming the major object of instruction. Social studies and science, with the exception of a mandated human relations program, are consequentially being pushed into the background. The "Concepts in Science" series is, however, available and is used regularly by some teachers and teams.

History of Training

The three teachers interviewed, and one or two others, were trained at the Wexford workshop and fall '72 MSU course. Two also completed the winter and spring courses. The opinion was expressed that the four-day experience was sufficient and the only gain from the MSU courses was the salary credit. This view generated no opposition.

No one reported being a development teacher, or knowing of anyone in the building who had come into the program after the initial group.

History of Support

USMES has received decreasing support from each successive principal. During 72-73 an adequate Design Lab and manager were provided and the principal seemed to take an interest in the progress of the program. During 73-74 a token economy was set up in conjunction with a reading program. Toward the latter part of the year the Design Lab room became also the redemption center and the manager its administrator. This year the room is an art room and what remains of the Design Lab equipment may be borrowed by teachers for use in theor own rooms. The current principal has given the staff no indication she has more than the most passing knowledge of or interest in USMES.

Likewise, the staff has felt no interest or encouragement from the district office; however, it was reported that another teacher in the district, a "Linda Napper", seems to be frequently trying to stir up interest.

Levels of Usage

All three used USMES during 72-73, and two used slightly during 73-74. There has been no use this year by any of the interviewees, nor to their knowledge by anyone else in the building. None feel it is likely they will use it next year.

(cont.)
School G

Style and Philosophy Concerns

All agreed that USMES required a somewhat liberal teaching style. It was pointed, out however, that this is also the tone of their building.

None had strong opinions pro or con relative to the USMES philosophy.

General Impressions

School G, with three administrations in three years, could well be expected to be a chaotic, frustrating setting in which to work. Instead, it seems to be a relatively smoothly functioning operation.

The semi-open structure, teaming, etc., sound quite hospitable to an USMES program; however, they were never seen in operation, and the staff seemed more to lean toward a rigid objectives approach than any other visited--a "grass is greener" effect? One teacher interviewed strongly desired to have one of the self-contained classes next year.

It appears USMES never caught on at this school. The staff attended the training, tried it, fulfilled their obligations, decided USMES was not for them, and terminated its use.